

The Mining Journal

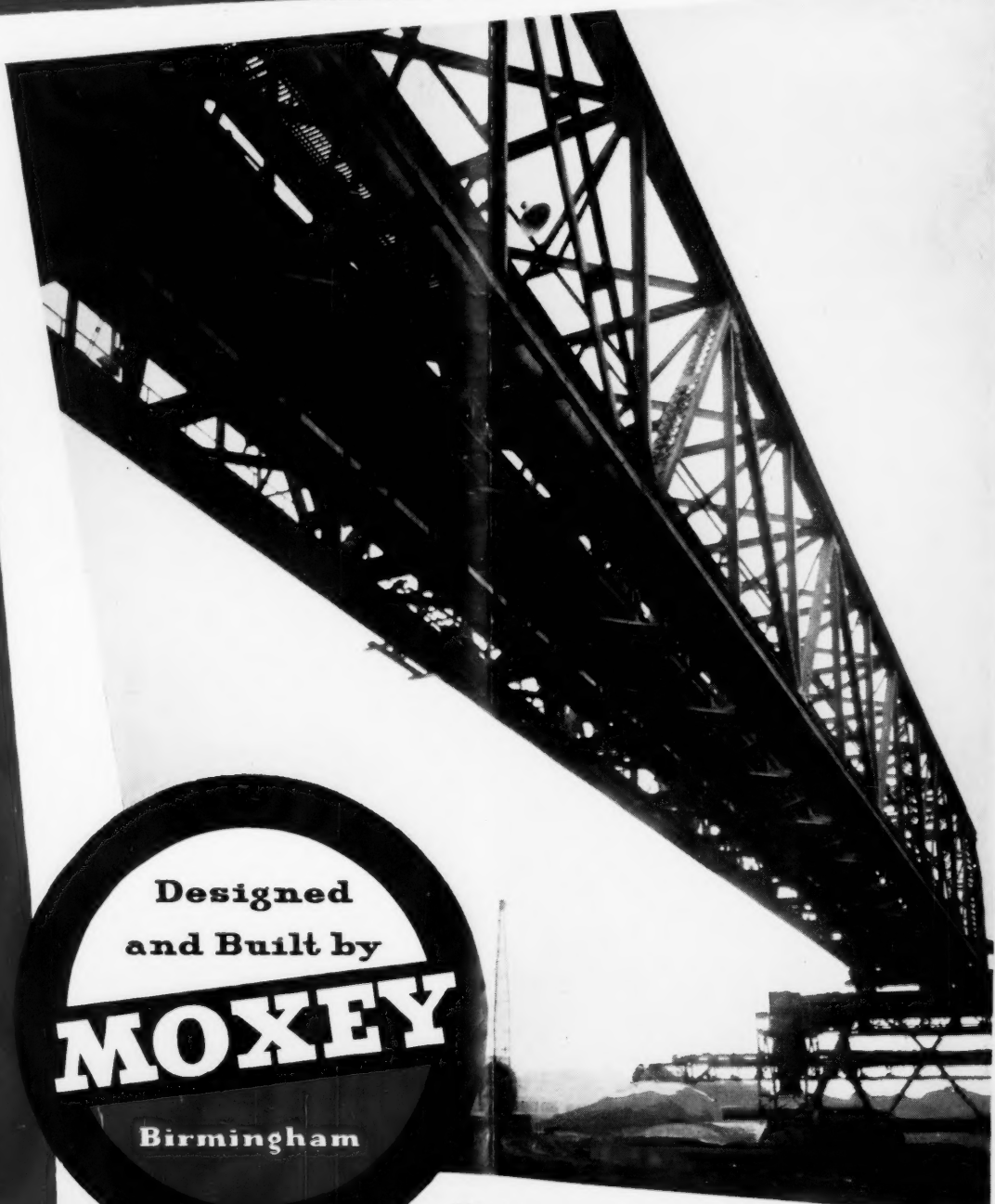
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Railway & Commercial Gazette

Vol. CCXLII No. 6188

LONDON, MARCH 26, 1954

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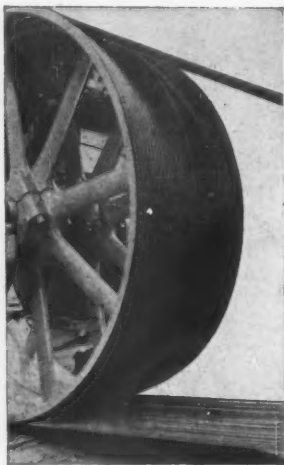


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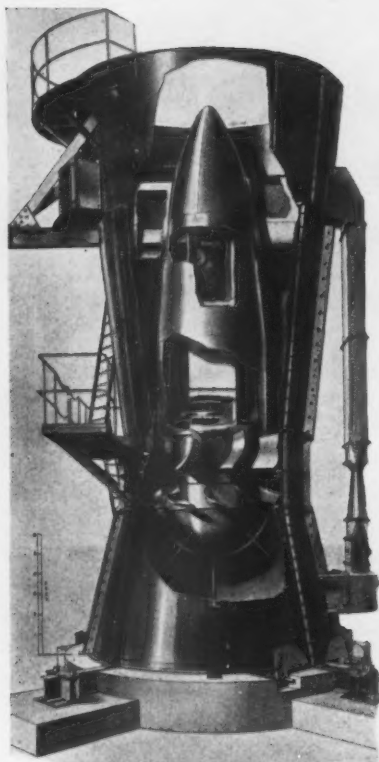
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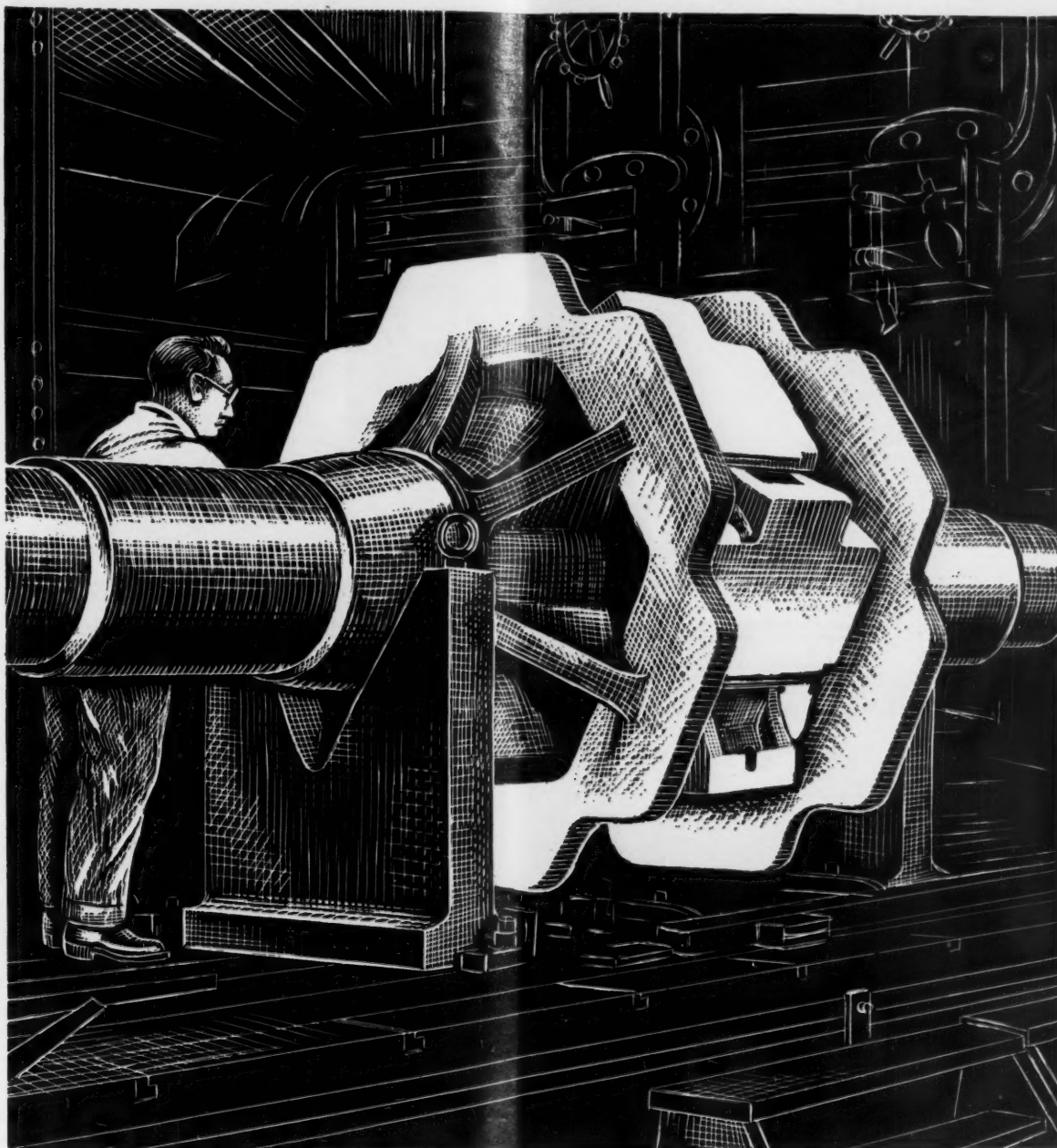
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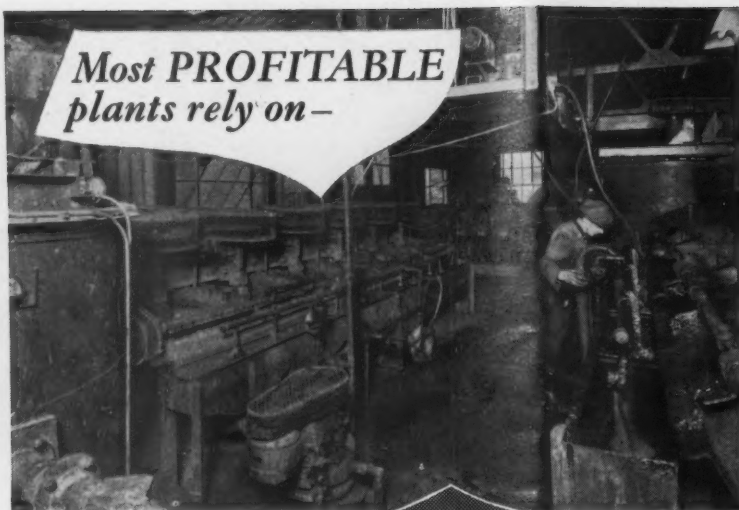


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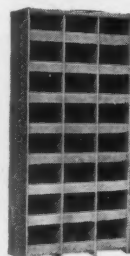
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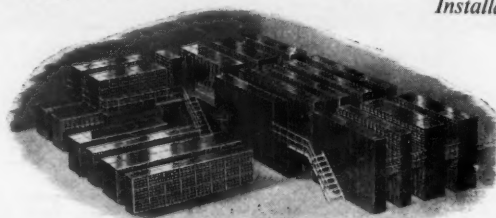
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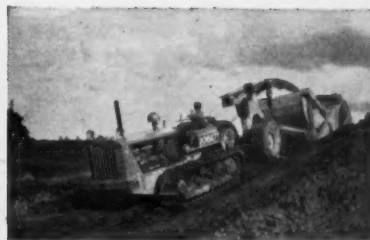
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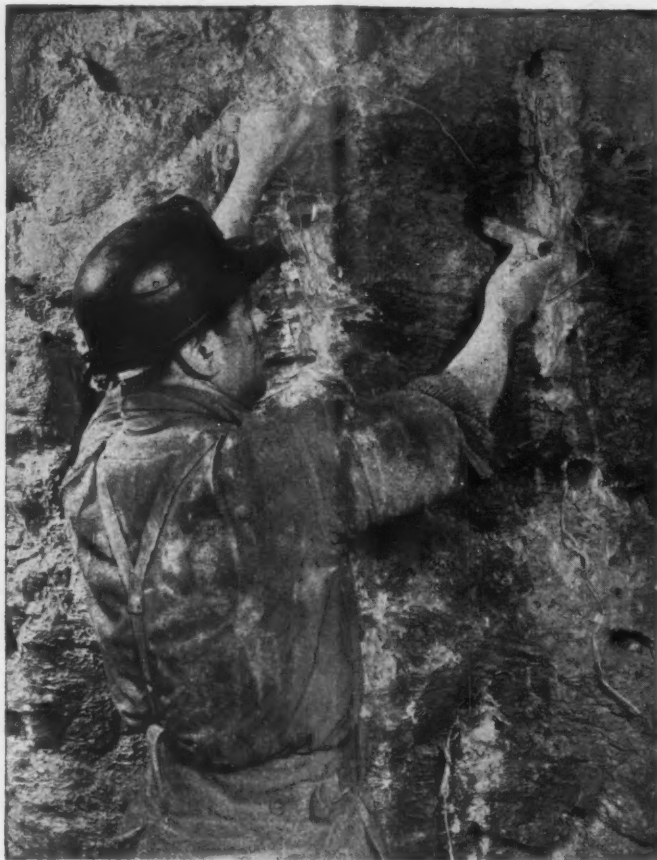
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NOTES AND COMMENTS

Strength of Sterling and Weakness of Gold

The Government's decision to re-establish the London Gold Market after an interval of 15 years and to remove restrictions on the use of sterling in transactions between non-sterling countries outside the dollar area was made known at the end of last week.

Although these two measures seem apparently unconnected, they do, in fact, stem from one basic assumption—the British Government's confidence in this country's continuing ability to maintain alike the strength of sterling and the balance of payments position between the sterling area and the rest of the world.

Indicative of the acceptability of sterling as a currency in which to conduct a large portion of the world's trade is the closing of the gaps between the different classes of sterling which currently present such a small differential that there is little, if any, inducement to switch from one variety into another. Parallel with the increase in strength of sterling is the weakness of gold, reflected in the running off of the gold premium brought about in part by the additional supplies coming on to the market from the Soviet Union, and in part to dishoarding. All that being so, the establishment of the London Gold Market should provide an inducement to those who formerly bought and sold gold in terms of the dollar to effect transactions in sterling.

Sales of gold on the London Gold Market will be unrestricted and the price will fluctuate in accordance with the free play of supply and demand. However, there are certain restrictions on purchases of gold. These are limited to those with sterling on dollar accounts; residents in the sterling area who have obtained a special licence from the Bank of England; and to those who have Registered Sterling—a newly created sterling account which enables those in this category to acquire gold if they are resident outside the sterling and dollar areas and offer U.S. or Canadian dollars against gold.

The removal of restrictions on the use of sterling in transaction between non-sterling countries in effect brings into being a single type of sterling free from the previous formalities which surrounded and hindered its use in several different types of transactions.

Broadly speaking, both measures are an expression of

the British Government's formal recognition of a situation in which practice had outrun theory, so that no immediate changes in this country's trading position can be looked for arising from the introduction of these measures. With regard to the Gold Market, it should be assured of a good volume of turnover as South Africa has declared its intention to market its gold in London—a welcome decision which may well be followed by the other countries in the Commonwealth.

U.S. Surplus Materials Policy

The U.S. Administration once again reaffirmed, in a Washington statement last week, its intention not to dump on the world market strategic stocks which had been bought under the stockpiling programme but which were subsequently considered to be in excess of defence and civilian requirements. Effect has been given to this intention through an Order issued by the Office of Defense Mobilization, which provides that (1) surplus materials acquired will be set aside for procurement for the national stockpile whenever materials on hand, or on order, do not fill stockpile goals; or will be added to the stockpile beyond established objectives when the President deems such action to be in the public interest; (2) surplus materials not transferred to the stockpile will be held by the Government for eventual disposal. In view of recent Washington statements on the surpluses, "the public interest" presumably means the international interest.

Disposal by the Government surplus to stockpile requirements will not, it was stated, be made either in whole or in part without prior approval of the President, or someone designated by him, and in any case it is the intention of the Order that disposal will not be made unless there is clear indication this will have no serious market consequences. The statement accompanying the Order also made it clear that at the present time there are only a few cases where stocks had been acquired in excess of immediate needs of defence and industry and that in each case the excess was small.

On the other hand, in a further progress report this week on the state of the stockpiling programme the Defense Mobilizer, Mr. Arthur Flemming, told a House appropriations sub-committee that the Government's stockpile is expected to possess huge surplus supplies, including copper,

lead, zinc and tin, during the calendar years 1954 and 1955 and that tungsten and magnesium might also present problems. None of the surplus materials would, he said, be offered for sale on the open market until stockpile objectives had been re-appraised and conferences were held with industries which might be affected by such action.

The O.D.M. is reported to be reviewing stockpile targets for some 60 items, including tin, copper, lead, zinc, aluminium, bauxite, chromite, cobalt, manganese and nickel, although it is apparently going to be some considerable time before any reassessment is made.

Although several questions are left unanswered, it does seem to emerge clearly from these statements first, that stockpile targets will continue to be somewhat elastic concepts; secondly, that stocks acquired by the U.S. Government, whether stockpiled or not, will be managed in such a way as to cause a minimum amount of disruption to international markets; and thirdly that from now on we may expect these surpluses to assume increasingly troublesome proportions.

The South African Budget

There were no changes proposed in gold mining and diamond mining taxation in Mr. Havanga's budget speech announced on Wednesday of this week.

However, owing to the satisfactory gold and uranium position the South African Finance Minister was able to argue from strength and propose tax concessions, including the abolition of the compulsory savings levy, which will involve the South African Treasury in a loss of revenue for the full year amounting to approximately £22,000,000. Perhaps the most important features of the budget were the granting of initial allowances of 10 per cent in the case of new machinery in manufacturing processes; the lowering of the surcharge from the present level of 15s. 1d. in the £ to about 10s. in the £; and the income tax reliefs granted to individuals.

These concessions, the Finance Minister said, are the result of the country's general prosperity which was no longer being undermined by inflationary forces. On the other hand, he believed the time had not yet come to relax restraints on credit, despite the lowering of discount rates of Central Banks in certain other countries.

Looking into the future Mr. Havanga estimated that through new gold and uranium production and import reductions in commodities such as petrol—soon to be produced in South Africa—the country's balance of payments would be relieved in four years' time by the receipt of at least £100,000,000 annually.

Private Investment Abroad

Mr. Selwyn Lloyd, Minister of State, Foreign Office, told the House of Commons earlier this week that private capital will have to play a considerable part in investment schemes for undeveloped territories. Making this point in a debate on world mutual aid, Mr. Lloyd developed his argument by saying that there was a great deal that undeveloped countries could do to make investments more attractive, and he went on to declare that these incentives to invest must be, safeguards against the possibility of expropriation and against excessive taxation. In connection with the former point, it will be recalled that the Gold Coast Prime Minister, Mr. Kwame Nkrumah, recently proposed legislation, which would provide against expropriation without adequate compensation to be written into the new Gold Coast Constitution.

Although what Mr. Lloyd has said has been preached in the City for many years, the important fact perhaps is that he made the statement less than two weeks before Mr. Butler presents his next budget. The encouragement of the

private investor in America to invest his funds abroad was strongly recommended in the recent Randall report and has since been supported by President Eisenhower. Therefore, it may be that Mr. Selwyn Lloyd's assertion was in the nature of a *ballon d'essai* to test reactions at Westminster. If so, and should Mr. Butler be able to encourage private investment overseas by way of tax reliefs, it will not only be considered as a welcome decision in itself, but will also show that the Government is aware of the importance of financing directly, or indirectly, this country's exports of mining machinery and other items and capital equipment.

The Search for Uranium

Throughout the world the search for uranium is now occupying the attention of more geologists than explorations for all other minerals put together, excluding oil. During the past year field investigations of ore deposits have been undertaken by officers of the Atomic Energy Division of the Geological Survey in most of the British Colonies, some Commonwealth countries, and various other territories overseas.

An indication of the key part played by the Atomic Energy Division in this critical field of minerals exploration is given by the Department of Scientific and Industrial Research in its *Annual Report for 1952-53*, which presents the wider ramifications of the organization and is discussed on page 360 of this issue. The report emphasizes that the time-lag between the discovery of an ore-field and the commercial production of mineral or concentrate is seldom less than five years, this period being necessary for treatment research and mine development, and the fruits of some early unpublicized work of the Atomic Energy Division are only now beginning to ripen.

South Africa's new uranium industry, which will ultimately raise a gross annual revenue of £30,000,000, stems from field work undertaken in 1945 in which the Division took a prominent part. Similarly, in South Australia the Department of Mines is vigorously promoting the development and exploitation of the refractory uranium ores at Radium Hill, following assessments carried out by British geologists in 1947. In Portugal a production plant now yielding high-grade concentrate derives its feed from ore deposits discovered some years ago during an intensive exploration programme undertaken by the Division.

The discovery during 1952 of a limited tonnage of good grade uranium ore in association with the copper deposits of Northern Rhodesia encourages the hope that greater finds will be made throughout the Copperbelt. In various other territories of Central Africa the Division's geologists have located new occurrences of uranium mineralization which merit further exploration. A laboratory examination of about 10,000 placer concentrates from the Gold Coast has given much new information on the distribution of radioactive minerals in West Africa. Field radiometric surveys are in progress throughout Bechuanaland and Swaziland.

In Britain, a programme of diamond-drilling for uranium has been undertaken at the derelict South Terras uranium mine near St. Austell, in Cornwall, but the existing ore reserves proved insufficient to support any significant mining operations. Attention has also been given in Cornwall to new techniques of geochemical prospecting for radioactive metals, the procedures developed being designed for use by prospectors in the more impenetrable Colonial territories.

The report points out that routine mineralogical identification work for prospectors and mining companies leaves little time for fundamental research, but a study has been published on a new mineral "cheralite," akin to monazite but rich in calcium, thorium and uranium.

Canada

(From Our Own Correspondent)

Sudbury, March 18.

Increasing importance is being attached to the uranium-bearing deposits in the Blind River section of Northern Ontario. Exploration through surface work and diamond drilling during the past year has indicated close to \$100,000,000 in ore with average values ranging from \$15 to \$20 to the ton. This is based upon the current rate of \$7.25 per lb., whereas the outlook is that a somewhat higher price may be negotiated.

URANIUM MINING PROGRESS

The two more advanced enterprises are Pronto Uranium Mines and Algom Uranium Mines. In both instances, the initial exploration has reached the stage where plans are under way to proceed with underground development. Pronto is already calling for tenders for shaft-sinking to a depth of 500 ft., the preliminary work having indicated 1,820,000 tons of \$19 grade and with only a small fraction of the favourable area so far explored. The deepest hole yet drilled on Pronto attained a depth of 1,950 ft. and intersected the downward continuity of the deposit and with greater width and values than in upper horizons.

Sharing in the development of Pronto Uranium is Preston East Dome, Frobisher's Quebec Metallurgical Industries, and E. H. Pooler and Co. Close observers see in Pronto the makings of an enterprise capable of attaining a production rate of 1,000 to 1,200 tons of ore per day. Final decisions as to mill capacity will await underground development and will also be governed to some extent by the price the Canadian government agrees to pay.

While Pronto Uranium and Algom Uranium are in the more advanced stages of exploration in the Blind River area, it is of significance that scores of additional discoveries have been made throughout the area on which exploration is proceeding and where conditions resemble to varying degrees the conditions prevailing at the beginning of work on Pronto and Algom. This points to increasingly widespread exploration during the coming summer and with good prospects of a major uranium-producing field in the making.

International Nickel Co. of Canada mined 13,667,000 tons of ore during 1953 and reported net sales of \$338,579,995. This suggests an average of more than \$24 from each ton of ore mined. Operating profit for the year was \$117,369,900. Income tax payments of \$43,945,837 together with \$19,730,000 for depreciation, retirement, etc., brought the net profit for 1953 down to \$53,694,526. This reveals that for each ton of ore mined during the year the net profit from all operations averaged very close to \$4

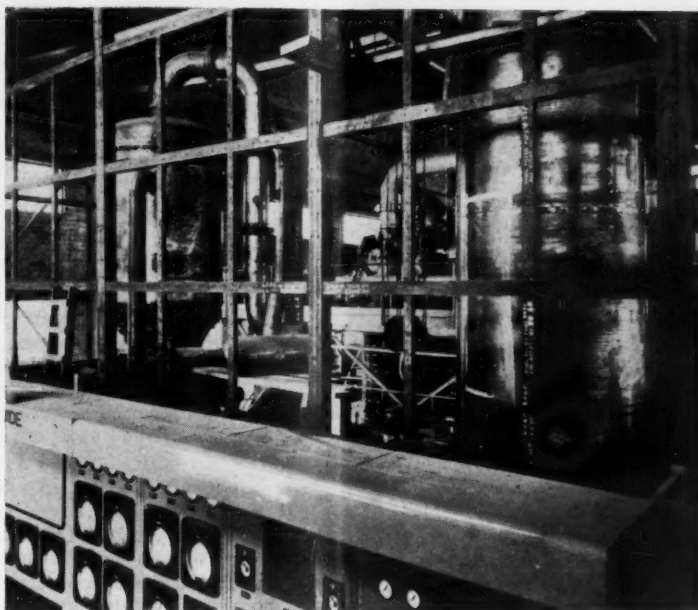
per ton. The proved ore reserves of International Nickel now stand at 261,541,259 tons. The company makes no official estimate of the value per ton of ore. As to this, an unofficial estimate of \$20 per ton appears to be reasonable—in which case the proved ore reserves of the company at this time would appear to exceed \$5,000,000,000. Despite such a large reserve of ore the company stands out as the most aggressive of all organizations in Canada in the field of prospecting and exploration.

INCO'S NEW OXYGEN PLANT

Indeed, the company has recently placed in operation a tonnage oxygen unit at Copper Cliff, which is the only one of its kind in Canada, and is designed to produce the oxygen required for the direct flash smelting of copper concentrates. Owing to the low temperature range involved, special consideration had to be given to the metals and other materials used in the construction. The important regenerator heat exchanger system consists of two nitrogen

regenerators 8 ft. in diameter and 17 ft. long, and two oxygen regenerators 4 ft. in diameter by 14½ ft. long. Working temperatures range from 80 deg. F. to 280 deg. F. Two other interesting pieces of equipment in the oxygen plant are an oxygen compressor and a turbo compressor.

Fifty-six mines throughout Canada received close to \$15,000,000 during 1953 in the form of Emergency Gold Mining Assistance from the Canadian government. During the year five gold producing mines closed down while no new gold mines came into production. This adverse trend for the gold mining industry promises to continue



Vessels containing the liquefaction apparatus of Inco's oxygen plant at Copper Cliff, Ontario

through the current year. With gold held down to the same price as prevailed 20 years ago, and with costs of operation swollen by the accumulated rises of wages and materials in the past two decades, it has become next to impossible to encourage investment in new gold mining enterprises. Indicative of the conditions is the fact that Hollinger Consolidated Gold Mines, producer of more gold than any other company in the history of Canada, announced a write-off of more than 260,000 tons as no longer of commercial grade due to the low price for gold and the prevailing high costs of production.

A survey for 1953 shows mineral exports from Canada amounted to approximately 55 per cent of total production, the mineral exports for the year having a value of \$731,000,000, compared with some \$570,000,000 consumed in Canada. A feature was the fact that all gold produced in Canada was retained by the Canadian government.

Heading the list of mineral exports during 1953 were the following nine elements: nickel \$162,542,304, aluminium \$160,565,684, copper \$113,616,782, asbestos \$83,972,163, zinc \$57,571,593, lead \$37,760,911, iron ore \$30,842,991, platinum \$26,278,956, silver \$16,845,234.

The Progress of D.S.I.R. Research

The Department of Scientific and Industrial Research might be described as the base of Britain's research pyramid. Besides running some 20 research stations, it maintains a liaison service with overseas countries, administers an information service, and is in close contact with 41 grant-aided Research Associations. Further progress in a number of investigations previously described in *The Mining Journal* is reviewed in the D.S.I.R. *Annual Report for 1952-53*, published by H.M. Stationery Office.

Since 1951 the electrical industry has been gravely concerned about the scarcity of selenium and this resulted in a request from the British Electrical and Allied Industries Research Association for an investigation. The Intelligence and Information Division of D.S.I.R. has carried out a comprehensive examination of the supply, demand and utilization of selenium, devoted mainly to the possibility of recovering this material from wastes and residues, particularly pyrites or pyrite cinders.

Germanium is a possible alternative to selenium in certain of its major electrical applications and it is estimated that the coal mined each year in the United Kingdom contains 1,500 to 2,000 tons of germanium. The germanium is probably associated mainly with the coal substance and no physical method of concentration is possible. In 1937 the Chemical Research Laboratory showed that germanium is concentrated in the dusts accumulating in certain of the flues in gas-works and that this material could be extracted. However, despite special efforts by producing firms to collect germanium-rich dusts, the present production—which is expressed in lb.—is barely sufficient for research and development purposes, let alone manufacture.

In collaboration with the British Electrical and Allied Industries Research Association the potential demand for germanium has been estimated, and it is anticipated that in three years' time the U.K. electrical industry alone may need five tons of germanium a year.

RESEARCH ON TITANIUM

Under the general sponsorship of the Ministry of Supply, research on the properties of titanium has been in progress in several British laboratories, including those of the British Non-ferrous Metals Association, whose part has been to make a rapid survey of the mechanical properties of a number of alloys, to be followed by a more detailed study of promising alloy types. The fabrication of titanium requires more complicated methods than those used for the base metals (e.g. melting must be carried out *in vacuo* or under argon) and the experience acquired by the Association in melting and in alloy production should be of value to industry when the metal achieves wide use.

The Metallurgy Division of the National Physical Laboratory has worked out the conditions under which titanium may be reduced directly from titanium oxide, and titanium that is workable when hot has been produced. Serious difficulties have been encountered in removing the last traces of oxygen and in obtaining a titanium that can be worked cold, but means of overcoming these difficulties are being studied.

As a service to industry a Collection of Pure Metals is maintained at the Chemical Research Laboratory under the guidance of the Pure Metals Committee. Samples are made available for metallurgical research. On the recommendation of the Committee an investigation has been initiated into the preparation of pure rare-earth metals.

Considerable interest has been taken in a method developed by the Radiochemical Group of the Chemical Research Laboratory for the recovery of gold and other metals from cyanide solution. In earlier work it was shown that iron and copper as complex cyanides are removed from a strong base ion exchanger by sodium cyanide solution, whereas the complex gold cyanide is not eluted, but can be removed by the use of organic solvents containing hydrochloric acid. These observations formed the basis of two of the separation steps of the gold recovery process. It has now been found that the amount of gold held by the resin is critical. If the loading of gold exceeds a certain figure (.5 meq. Au/g resin) gold is eluted to some extent by sodium cyanide.

In the course of the analytical work considerable experience has been gained in the application of chromatography to geochemical prospecting. Geochemical methods of prospecting call for the analysis of large numbers of soil samples for a variety of metals. High accuracy is not required, but speed and ease of operation in the field are essential. The paper strip technique as applied to inorganic materials appears to provide an admirable tool for geochemical work. A few metals such as nickel, cobalt, copper and zinc have been examined and promising separation has been achieved by this method. Several soil samples have been examined and, in spite of difficulties associated with large quantities of iron and aluminium usually present, the results show that the method can be successfully employed for this purpose. The separation of other metals is now being examined.

A scintillation counter for particles to determine continuously the uranium content of solutions has been constructed. It has been found that satisfactory correlation is obtained between count rate and uranium concentration.

TRANSPORTATION OF COAL

A method has been found of co-ordinating effects of the different variables on a non-dimensional basis, and although more fundamental work is required to explain the exact mechanism of the process, it is now possible to estimate the pressure drop along a pipe in practical cases. The results so far obtained indicate that hydraulic transport of coal for distances of at least several miles will be economic, provided the technical problems of plant design can be solved.

An even more promising application would be vertical transport, possibly from the working face to the surface, particularly in mines where the capacity of the winding gear is a limitation on mine output.

Investigations on the development of coal conveyor belts free from fire risks have been continued by the Research Association of British Rubber Manufacturers, in collaboration with belting manufacturers and the National Coal Board. It has been found that a belt in which the textile warp is "Terylene" or other fusible fibre, when installed upon a rotating drum, breaks before it becomes hot enough to inflame, thus avoiding the fire risk that exists with the normal cotton belt. As an alternative approach, it has been found that compounding the rubber used for impregnating and covering the belts with a special chlorine-containing polymer, gives it considerable resistance to flame while maintaining strength and other necessary properties. Already experimental belts have been made that come very near to meeting the National Coal Board's stringent test requirements.

Exploitation of the Kiruna Iron Ores, Sweden

By J. B. RICHARDSON, A.R.S.M., M.I.M.M.

The Kiruna iron ore mines, Sweden, situated in the Arctic Circle, have the largest production of high grade iron ore from a single ore body in the world. Mr. J. B. Richardson visited the Kiruna mines in September-October, 1953, to see for himself how this giant operation was proceeding, and in the following article he gives a detailed account of the geological formation of the ore and the methods of mining and transportation employed in its exploitation. Not the least interesting description is his account of how the ore is hauled direct from the underground workings to the port of Narvik, Norway.

Kiruna has the largest production of high-grade iron ore from a single orebody in the world. Yet for two centuries it was unheeded after it was first heard of over 250 years ago when Samuel Mort, a bookkeeper at a small iron works in Sweden, wrote in 1696, "The hereinafter mentioned iron mountains lie exposed, that is to say, on the western side of Jukkasjerf there are two iron mountains situated near the river and called by the Lapps Lassavara." When the Thomas process made possible the smelting of phosphoric iron ores attention was again drawn to the isolated orebodies already known to be rich in iron and at the turn of the century they were opened up to develop in 20 years into the most important mining enterprise in Sweden.

THE KIRUNA ORE BODY

The orebody occurs in what is called the Fennoscandian shield, a part of the earth's crust that has constantly been buckled and twisted whilst the surface was being eroded. These processes gradually exposed the underlying rocks bringing to light granites and other rocks into which layers of porphyry, lava, tuff and sediments that have been kneaded and crystallized and in turn mixed with newer intrusions. As a result of intense folding and pressure most of the pre-Cambrian ores have been mangled into irregular lenses through which the present surface is a fortuitous cross section. Some of the lenses taper off in depth and others increase in size. The Swedish ore-bearing leptytes have this kind of origin.

In spite of the fact that the Kiruna orebody belongs to the earliest pre-Cambrian formations it has been surprisingly little altered even though it is intensely folded and faulted. It is a typical primary eruptive ore thrust up between two somewhat older porphyries, the iron ore and the porphyry being segregated from the same magma. Exposed along the crest of the Kirunavara ridge it continues for another two kilometres northward as two parallel lenses under Lake Luossajarvi to reappear at Luossavara still farther north as an isolated orebody on the top of that hill, with half a kilometre to the east, a southern orebody, the Rector, with an unusually high phosphorus content. The main Kiruna orebody is cut off to the south by two faults shifting it eastward. Including Luossavara and Rector the total area is nearly 500,000 sq. metres (over 5,250,000 sq. ft.) which means that each vertical metre should yield nearly 2,000,000 tons of ore.

Magnetic surveys and diamond drill holes whose total length is nearly nine miles have proved an orebody of variable but fairly consistent width (the deepest bore was over 2,400 ft. below the level of Lake Luossajarvi) giving total estimated reserves of 1,600,000,000 tons of which some 200,000,000 tons have been excavated to date. The original height of Kirunavara was 748 metres (nearly 2,500 ft.) above sea level, well above the timber line.

The ore is typical apatite ore with a high iron content such as rarely occurs on a major scale in any other part of the world.

The orebody that is worked at Kiruna mine is three miles long and averages 300 ft. in width with a maximum width of 650 ft.

Unlike Malmberget or Grängesberg where the richer ore is mixed with lower grade material and country rock and has to be crushed and separated; at Kiruna all the ore is won direct as high grade lump ore and no concentration plant is required other than a small sorting plant for the separation of wall rock that has become mixed inadvertently with the ore in blasting. Thus there is little dilution.

For many years the only method of working was by opencast, the ore being transported down the hillside by inclines to the foot of the hill. As the workings proceeded southward a deep gorge was created along the entire length of the orebody until the present opencast is over 10,000 ft. long and up to 1,300 ft. wide and at the northern end the lowest bench is only 16 ft. above the level of the railway.

The present system of opencast working is by benches about 50 ft. high. A row of 9 in. holes is drilled, 16 ft. apart and about 15 ft. back from the face of the bench, the holes being drilled to just below the toe of the bench but without toe holes to assist breaking down the ore as it breaks readily.

Some 20 of these 9 in. holes, the number varying with the width of the bench, consume about a ton and a half of explosives. The charges are connected up by cordtex and fired electrically in one big blast. Blasting is always done at fixed times—10 a.m. and 7.15 p.m.—and results in up to 20,000 tons of broken ore.

DRILLING METHODS

At present drilling is done by churn drills mounted on caterpillar track with a 30 in. stroke at a rate of 55 blows a min. and the weight of the drilling rig is 1,500 kilos. At the time of the visit some experimental work was being conducted in the lower part of the opencast with wagon drills of Swedish make and the information was that it was giving a faster drilling speed and satisfactory results in other directions so that there is a possibility that it might be adopted generally for opencast working as such machines are lighter and more mobile.

The benches have not been developed according to any regular plan but arranged always to give the maximum number of points of attack because care has to be taken to provide a sufficient tonnage of the different grades of ore and to keep them separate. For this purpose control is exercised by means of a phosphorus chart of the workings obtained, of course by sampling and assaying. Though in the early days there was practically no wall rock to be blasted, as the pit got deeper hanging wall rock had to be broken for safety and the ratio at present is little less than one to one, ore to waste. The broken waste rock is hauled away to be deposited at the southern end of the workings where it forms huge terraces that now surround the southern end of the mountain.

The present plan is to extend the opencast right down to railway level and this point should be reached somewhere about 1960.

In the opencast the broken ore is loaded by electrically-driven, caterpillar-mounted power shovels with an average capacity of 2,000 tons a shift, the power transmitted through

heavy cab-type trailing cables. There are 16 of these units on the site. The ore is loaded into 50 ton Euclid type diesel-driven trucks which take the broken ore over the floor of the benches, which, by the way, are kept excellently levelled, to one of five ore passes at the top of each of which is mounted a large primary jaw breaker crushing all the ore to minus 10 in. The crushed ore then drops into pockets just above railway level from which it is drawn off through compressed-air-operated gates to the waiting main line ore trucks of special design.

Costs and labour employed in the opencast have not greatly increased in spite of increasing depths and rising wage rates, because mechanization has kept pace with the situation. Modern machines are employed, and experimentation in newer equipment is always in progress, so that although the output has increased over five times, the labour force employed is only 25 per cent greater.

Some of the ore is won to-day from underground workings below the level of the lake and formerly the method adopted was shrinkage stoping in 150 ft. high stopes, the walls being sufficiently strong to prevent any serious dilution.

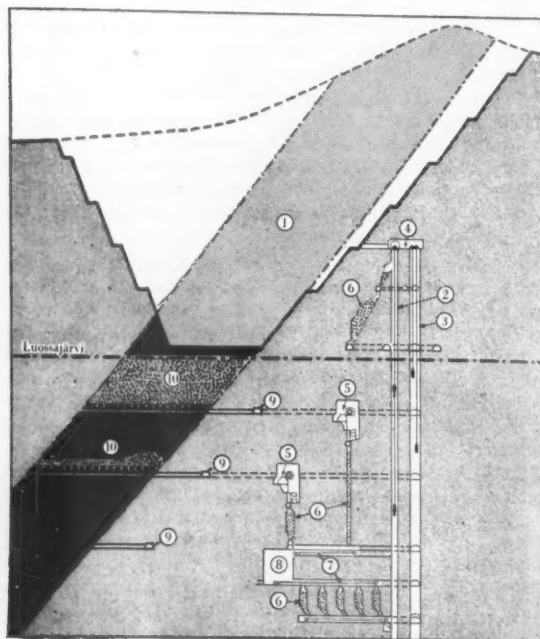
The present main haulage roads are at 275 and 320 metres below datum, which is the original summit of the Kirunavara mountain.

DEVELOPMENT PLANS

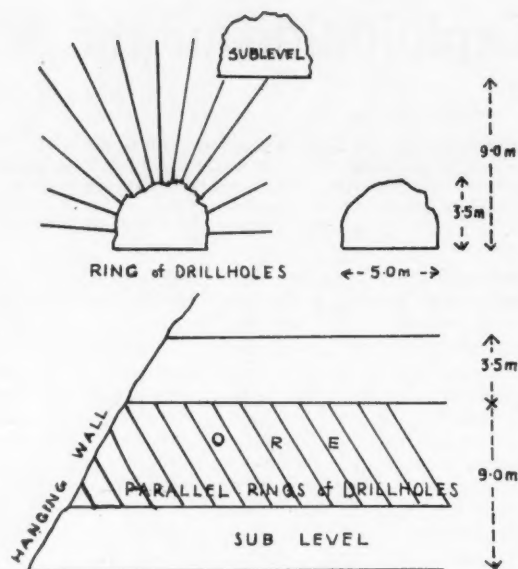
The most interesting technical feature of the whole visit was the orderly plan to get progressively more and more ore from underground until all is won from that source.

The future planned outputs are as follows:

Year	Opencast	Underground
	(000,000 tons p.a.)	
1953	7.0	1.5
1954	6.5	2.2
1955	6.0	3.5
1956	5.0	4.5
1962	Nil	12.0



Cross section showing underground mining scheme at Kirunavara: 1, worked out opencast; 2, ore shaft; 3, manway shaft; 4, hoist gear; 5, crushers; 6, loading pockets; 7, belt conveyors; 8, separation plant; 9, haulage tunnels; 10, stopes



General arrangement of stoping method at Kiruna

The grandiose plan for further underground development was well in hand. The old railway tunnels were driven in the orebody and will have to be abandoned as they will form part of the bottom of the opencast, so new main railway tunnels have been constructed in the footwall of the orebody. Two of the new tunnels are for ore transport and the other for men and materials.

The five sets of shafts being sunk to the bottom of the mine are well in hand and are divided into manways and hoisting compartments with skip loading, each having a capacity of 2,000,000 tons a year. Loading pockets are to be excavated for the different grades of ore with crushing plant crushing to minus 4 in. and sorting plant at each set of shafts. On the main haulage levels 25 ton cars will take the selected ore to the series of shafts.

The ore will be skip hoisted at a rate of 500 tons an hour to pockets situated above the railway tracks in the new footwall tunnels and fed through gates into the railway wagons. Four rope koepe winders with counterweights and 20 ton bottom dumping skips will be used.

The general method of underground mining to be adopted is sub-level caving with 9 metre slices and transverse drifts 5 metres wide by 3.5 metres high across the orebody at 10 to 12½ metre centres. Rings of 12 to 16 up holes will be drilled from the drifts, and the machine used for the work will be a two drill jumbos with special long drill carriages. A ring of holes will average 250 ft. of drilling and should be accomplished by one driller within the drilling shift.

The reason for adopting sub-level caving as a general method when the bulk of the ore comes from underground is because the method will make it possible to mine selectively and so keep the different grades of ore separate, a most important factor in mining at Kiruna as at present five main grades of ore are mined and are as shown in the following table

Kiruna	Fe	P	SiO ₂	CaO	MgO	Al ₂ O ₃
A	68	0.024	2.5	0.7	1.1	0.4
B	67.8	0.056	2.4	0.8	1.1	0.4
C	67.3	0.23	2.2	1.2	1.0	0.4
D	60	2.0	2.7	7.2	1.3	0.4

The D grade has a variable iron and phosphorus content and between this and C grade it is customary to pro-

duce two other grades which are not shown in the above list according to different customers requirements. The figures illustrate the point that as the iron content increases the phosphorus content goes down, while the phosphorus and calcium oxide contents go up together because they are the main constituents of apatite (calcium phosphate) and its presence obviously reduces the percentage of magnetite.

SURFACE INSTALLATIONS

Besides the underground transformation scene there are many alterations and much activity on the surface. New and larger mechanical and electrical workshops are finished and the equipment was being installed, much of it having been already delivered. New bath-houses and offices and accessory buildings are being grouped between the foot-wall side of the mountain and the side of the lake away from any area likely to be disturbed to the west of the ore-body. The new brick lined buildings are modern, well lighted and heated, and equipped with up-to-date machinery.

As mentioned above the special bottom discharging main line wagons are loaded underground and the laden trucks emerge to run on to a special quay on the lake where preliminary sampling is done. The trucks are then assembled in the marshalling yard 506 metres (1,660 ft.) above sea level and coupled into trains of 40 to 45 trucks, the ore load averaging 35 tons so that an average train will contain 1,500 tons of ore to be hauled to Narvik, 169 kilometres distant, via the frontier town of Riksgransen, 521 metres (1,710 ft.) above sea level. The steepest gradient is along the southern shore of Lake Tornotrask, 60 miles long, certainly one of the most beautiful lakes in the world, to the frontier. The line then descends to sea level so that there are no serious gradients against the loaded trains on the outward journey from mine to the port. Large main line 3,000 h.p. electric locomotives weighing 130 tons haul the ore trains.

While the ore is on its way to Narvik assays are made of the samples taken at the mine lakeside quay and the results telephoned to the port so that the trucks on arrival can be shunted to the appropriated stockpile according to grade.

CONSTRUCTIONS AT NARVIK

The port has at present a population of about 10,000, all dependent directly or indirectly on the iron ore traffic. At the port the ore is crushed to minus 4 in. in crushers which have a combined capacity of 6 tonnes. There is a steam plant for thawing frozen ore and power shovels for loading it from the stockpiles to ensure smooth continuous loading of ships and no delays. There are 40 kilometres of track in the marshalling yards. The bottom discharge trucks can load direct through chutes into the holds of the ships and there are also belt conveyor systems fed from the stockpiles for rapid loading. A 10,000 ton ship can be loaded in from six to eight hours and about 15 hours are required to load a 25,000 tons ship.

For final weighing and sampling half a per cent of the cargo is passed through a special crusher and each truck is automatically weighed and sampled. At the time of the visit ore was being received from the mine at the rate of 30,000 tons a day.

Power for the mine comes from the Porjus hydro-electric power station 74 miles away and is transmitted in overhead cables at 70,000 V. 3 phase 25 cycles. At Kiruna it is stepped down to 22,000 V. and is used for heating and lighting as well as for driving machinery, as it must be remembered that the opencast and the waste dumps are floodlit all round the clock in the depths of winter. Some power is converted to 600 V. D.C. for electric locos and passenger trams between town and mine.

The Rhodesias

(From Our Own Correspondent)

Salisbury, March 20.

The Southern Rhodesia Government has stated this week that the effect of the decision to re-open a restricted gold market in London is difficult to forecast, but its importance should not be exaggerated. It is felt that the new arrangements will have precisely the same effect as the system hitherto of selling gold produced in the Federation through London brokers. The opening of a free market for the purchase and sale of gold for sterling does, however, create an additional facility for the purchase of gold by non-residents of the sterling area, although it will not necessarily lead to an increased demand and a higher price. The statement concludes: "The Southern Rhodesia Government warmly welcomes the move, which should not only be an additional factor in strengthening sterling, but may well pave the way to an increase in the official price of gold."

The arrival in Kitwe of Sir William Lawther, in his capacity of secretary of the Miners' International Federation, has again focussed attention on the labour situation on the Copperbelt. Preliminary discussions between Sir William and leaders of the European and African mine-workers' unions have been held, as a result of which Sir William, who is accompanied by two officials of the Trades Union Congress, said on Thursday that he was very hopeful that in spite of the difficult problems involved a satisfactory solution would be reached. The question raised by the differing wage scales and living standards of European and African presented, in his opinion, certain parallels with the dispute on equality of pay for the sexes in the United Kingdom. Sir William is to present his findings to the Miners' International Federation congress in Dortmund this year.

IMPORTANCE OF POWER

The lengthy statement issued this week by the Chamber of Mines of Rhodesia urging that the Kariba Gorge hydro-electric scheme should be started as soon as possible, preferably before the Kafue River scheme, was to be expected after the announcement earlier in the month of substantial increases—ranging from 30 to 40 per cent—in the price of power supplied by the Southern Rhodesia Electricity Supply Commission. The proposed increases, which are due to come into operation on April 1, constitute a matter of gravity for the mining industry of Southern Rhodesia.

The Rhodesian Mining Federation executive, which discussed the issue recently, believes that if put into operation the increases will lead to the immediate closure of borderline mines and hasten the closure of others. The Colony's mining industry purchases about one-half of the Supply Commission's output. Meanwhile, the *Northern News*, the only daily newspaper in Northern Rhodesia, in a leading article this week pointed out that the Chamber of Mines of Rhodesia is purely a Southern Rhodesian body, and that the £19,000,000 worth of minerals produced in Southern Rhodesia last year represents something less than one-third of the revenue earned by Northern Rhodesian mines. If the power from Kafue is not provided, the economy of the Northern Rhodesian mines—which contribute one-third of the Federal income—will be upset and so, of course, will be the Federal income, points out the newspaper. It does seem, on the face of events, that the Chamber of Mines has left its effort a little late, now that the Federal Government is more or less committed to making a start with the Kafue scheme first.

Columbite Production at the M'Buye Mine, Ruanda Urundi

The M'Buye mine, operated by Société Minière de Muhinga et de Kigali in the Belgian Congo, is one of the few occurrences where columbite appears as a dominant, and not as an accessory, economic mineral. In the following article, condensed from *Mineral Trade Notes* Vol. 37 No. 6, published by the U.S. Bureau of Mines, particular emphasis is given to the geological formation of the area, wherein the columbite is carried in a kaolinized pegmatite.

The M'Buye mine is one of the few occurrences of columbite where it is a dominant economic mineral rather than an accessory one. The mine is operated by Société Minière de Muhinga et de Kigali (S.O.M.U.K.I.), one of the important mining companies in Ruanda Urundi, and was discovered in 1942, but prevailing low prices for columbite and the mine's location in an area somewhat removed from other operations of the company, prevented exploitation until the end of January, 1951. Exploration carried out during the war was confined to surface prospecting, which uncovered an eluvial deposit estimated to contain 60 tons of columbite and 103 tons of cassiterite. The mine produced 7 tons of columbite and 13 tons of mixed ores in 1951, and 10 tons of columbite-tantalite in 1952.

The mine is in the east central part of the Zaza 30-minute Quadrangle, at 2 deg. 18 min. S. and 30 deg. 24 min. E. and is within the 1,569-hectare concession of the same name and exploitation rights for cassiterite, tantalite and columbite are held for 90 years beginning October 12, 1943.

Geologically, the M'Buye mine is within the extensive area of Pre-Cambrian crystalline rocks that characterize most of the eastern part of the Trusteeship Territories, and in which the productive mines are quite common. The columbite-bearing kaolinized pegmatite occurs very close to the contact between the Lower Urundi formation, characterized by a series of schistose-quartzitic rocks, and the Ruzizi formation, which is more purely schists. This locality is near the south-eastern extremity of an elongated area of Ruzizi rocks, which extend to the north-west for approximately 65 kilometres, following approximately the course of the Nyawarongo River almost to the 20 deg. S. parallel, and then continuing, to pass east of Kigali, and extend to a point some 25 kilometres north-west of the above parallel. South-west of the mine and as far as Lake Rugwero, the subsurface geology is masked by a thick deposit of Quaternary sediments of lacustrine and fluvial origin. Thus, situated near the contact of the two formations, there would be an ideal geologically controlled location for the intrusion of the pegmatite, apparently an igneous emanation from the extensive granitic mass just west and extending north-east from Lake Tshohoho Sud almost to the Nyawarongo River, or the more extensive Nyanza granite further west, which is commonly considered as the parent magma for the many pegmatites in the Katumba area.

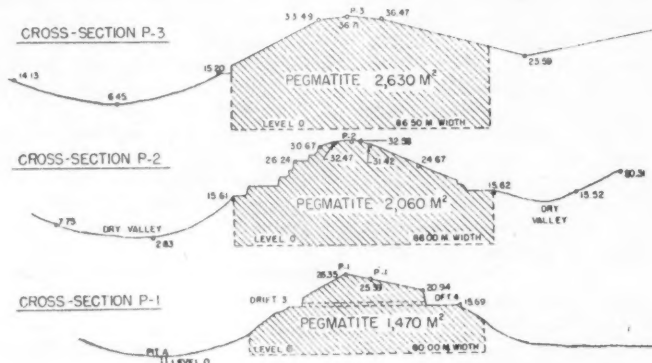
The M'Buye pegmatite is contained in a sort of spur known as Kukumasare Hill, which trends about N. 45 deg. E. and rises 23 to 36 metres above a dry valley to the west. The pegmatite is a type of dome and its western contact with the schists shows a dip of 60 deg. to the west. Originally capping the surface was an eluvial deposit of columbite and cassiterite about 1 to 2 metres thick which was the first discovery, and until subsequent exploration was undertaken these eluvials were considered the only economic mineralization. The pegmatite extension and occurrence of values is being proved by a series of underground workings,

following the contacts with the enclosing schists and crosscutting of the pegmatite. The pegmatite has a quartz core, as well as numerous pockets and aggregates of small books of mica. Some of the quartz is barren, but rich pockets occur adjacent to the core and in the quartz surrounding these pockets the quartz itself contains values. There is considerable enrichment with the mica aggregates, which in places constitute a true greisen zone and even the kaolin carries a persistent mineralization. Some schist inclusions are found within the main mass of the pegmatite, but these are apparently small and near the contacts.

All indications are that the pegmatite will run 1 kilo per cu. metre and that of this 80 per cent will be columbite and 20 per cent cassiterite. Underground workings have been sampled by panning a representative fraction of each day's excavation and compositing these into a monthly average. Some indication of tenor is found in the following tabulation of recovery, volume treated, and average content per M³ for the first eight months of 1952, during the course of exploration and small-scale exploitation on the surface:

TENOR OF MATERIAL TREATED			
1952	Treated (cu. m.)	Recovered (Tons)	Content (tons per cu. m.)
January	1,076	2.1	.002
February	1,237	1.6	.001
March	1,129	1.1	.001
April	1,365	1.6	.001
May	1,588	2.2	.001
June	1,421	2.3	.002
July	1,492	1.7	.001
August	1,377	1.2	.001
	10,685	13.8	.001

Work done, down drainage from the primary deposit, has shown the existence of alluvials, but the values are low,



Cross section of pegmatites at M'Buye mine

the tin content of total value is high, and the ratio of overburden to pay gravel is high.

South-west of Kukumasare Hill the dry rivers to the west and south come together, and at a point 210 metres from Pit A at the "O" level the flat is 50 metres wide. Three Banka drill holes sunk to a depth of 12 metres showed negative values. Two hundred metres to the south-west the width is still 50 metres, but two holes 20 metres apart in the flat show: 13.10 metres of overburden, .90 metre of gravel, with a tenor of .001 tons per M³, of which 60 per cent is SnO₂; and 11.60 metres of overburden, 2.30 metres of gravel, with an average of .001 tons per M³, of which 30 per cent is SnO₂, respectively. A hole on the north-west side showed 5.50 metres of overburden and .50 metre of gravel but no values. There is a terrace on the south-east end of this line and a hole 50 metres from the centre of the flat showed 10.10 metres of overburden, 2.90 metres of gravel, but only .0001 tons per M³, of which 50 per cent is SnO₂. Water in the latter pit was struck at 6.40 metres, and all four holes were bottomed in schist bedrock.

Another line of holes was put down to schist bedrock 210 metres south-west of the preceding line. Here the flat is 107 metres wide; five holes in the flat gave, from north-west to south-east, the following sections:

Hole	m. overburden	m. gravel	lb. per M ³	SnO ₂ %
1	8.0	5.75	traces	?
2	10.20	5.95	0.00010	?
3	15.00	1.60	0.00013	50
4	12.50	4.20	0.00004	80
5	9.70	8.30	0.00004	60

A final line "O," 130 metres further down drainage showed the flat to be 120 metres wide and in swampy ground. Two holes, on 50 metre centres, indicated over-

burden thicknesses of 14.05 and 13.50 metres, gravel was 3.20 and 2.80 metres deep; one hole showed a tenor of 200 grams, the other 320 and in both instances the SnO₂ content was 50 per cent of the total. On the basis of this exploration of the alluvials their exploitation would hardly be economically feasible even under present prices for columbite. The property however, even without the alluvials, constitutes an important reserve, considering the natural scarcity of columbite.

OUTPUT TO DATE

Output from the mine was first reported in 1951. Production included 5.943 tons of commercial columbite and 3.861 tons of mixed columbite-cassiterite, a total of 9.804 tons. In 1952 6.700 tons of columbite and 12.916 tons of mixed columbite-cassiterite was produced, a total of 19.616 tons. Figures for the first half of 1953 show output at 9,900 tons, all classed as mixed ores. Service des Mines reported in September that production was 1,500 tons a month, but no data on the composition of the mixed ores is available. Total output through June, 1953, was 39,320 tons. At the average of 1.284 kilograms per M³, the January to August, 1952, average, the above output would call for moving 50,486 M³. As this volume has been obtained from a small area of the mineralized zone it is obvious that estimates of reserves are conservative.

The company has plans to continue prospecting and to gradually install adequate concentrating equipment, and 13 lb. were sold in 1952. Stocks at the end of 1952 were 16 lb., and all shipments were to Belgium, for treatment. It is reported that the company has contracted for the sale of all its columbite to English companies to June 30, 1955.

Competition Between Aluminium and Steel

The Secretariat of the United Nations Economic Commission for Europe has recently published on its own responsibility, a comprehensive study on the competition between aluminium and steel, the first of a series of such studies of materials competitive with steel. The following article is a condensation of the study, and includes notes on production and costs, as well as indicating those industries in which use of aluminium finds an application. Broadly speaking, the conclusion reached by the Secretariat is that from the viewpoint of total consumption, competition between iron and steel and aluminium is still and will remain on a small scale.

The most important area of competition between aluminium and steel is with thin flat products, where aluminium is competing with steel to the extent of about 3 per cent of the world thin flat products production. Relatively minor competition is offered in the form of tubes, light structural shapes and castings and forgings, where aluminium is competing to the extent of only 1 to 1.5 per cent. Nevertheless, in recent years the aluminium industry has developed many new uses for the product and has engaged in extensive market research, and it is necessary for the steel industry also to adopt an imaginative approach to these problems, but on the whole it is thought that both industries may well expand together without one inconveniencing the other.

DEVELOPMENT OF ALUMINIUM

The first part of the Study is essentially of a background character and discusses, on a world scale, the growth of the aluminium industry, both in the past and as it is likely to be in the future, on the basis of published plans. In the second part, attention has been focussed on Europe. An attempt has been made to define the area of competition between the two metals and to compare the trend of costs and prices in the two industries. Thereafter competition in industrial uses has been discussed.

Long-term trends in the aluminium industry show, since the beginning of the century, an increasing production of 10 per cent year, which means that output doubles every seven years. This rapid growth which has been observed

in the past is likely to be maintained in the seven to ten years ahead. World production of primary aluminium was over 2,600,000 tons in 1953 and is planned at some 4,500,000 tons by 1960.

The higher rate of expansion for aluminium than for steel means that aluminium is constantly growing in importance. Even so, competition between both metals is and must remain small. World production of aluminium, when expressed in steel equivalent, represented in 1952 no more than 2.8 per cent of world production of steel. In 1960 this figure should stand at some 4.2 per cent.

The centre of aluminium production moved during the war years to North America and whereas 54 per cent of the production in 1939 was in Europe, the proportion had dropped to 18 per cent by 1953 and will continue to decline sharply as production tends to move to the centres where cheap electric power is available.

On the basis of present plans, major increases in production capacity are planned in the United States. More striking, however, is the Kitimat project in Canada, which may have 500,000 tons of new capacity in operation by 1958-60. The United Kingdom has under consideration a major plan for the development of aluminium on the Volta River (Gold Coast); the initial plan is for 80,000 tons a year rapidly expanding to 120,000 tons with further prospective increases. France is also studying the possibilities of building a 100,000 tonne unit in French Guinea and a 40,000 tonne unit in the Cameroons.

Definite information about the U.S.S.R. and Eastern Europe is not available but it appears that the centre of production in the former is moving east of the Urals and that 335,000 tons additional capacity is planned. The production in Asia and Latin America is likely to remain on a small scale in the near future except in Japan which is planning to rehabilitate most of its war-time installations and attain a total capacity of about 100,000 tons a year.

The geographical trends therefore indicate that aluminium smelting will be increasingly carried out in countries located far away from the centres of processing, fabrication and consumption. At the beginning of 1953 nine countries in Western Europe had an aggregate capacity of 481,000 tons distributed among 33 plants, less than an average of 15,000 tons per plant. In contrast, the average production of a plant was 50,000 tons per annum in the U.S.S.R. and 85,000 tons in the U.S.A. The largest plant now in operation in the world is at Arvida, Quebec, with a capacity of 320,000 tons. By 1960 the situation in Europe will have undergone little change and the bulk of European output will still come from relatively small plants. In other regions of the world the tendency towards larger plants will continue.

The shipment of aluminium in ingot form over long distances, for instance, from Canada to the United Kingdom, has already grown to large proportions and is bound to increase, since the cost of freight by sea for a light material such as aluminium plays only a negligible part in the total cost of the final product. Most of the primary aluminium entering into foreign trade is handled by four countries: the United Kingdom and the United States the two great importers, and Canada and Norway the two great exporters. Eighty per cent of the primary aluminium entering into world trade is currently produced in smelters owned by Aluminium Limited.

PRICES AND COSTS

During the last 30 years prices of aluminium have gone down significantly while prices of steel had rising tendencies. The decreases in aluminium were due to technological improvements but this progress cannot be expected to continue at the same rate as the production methods become somewhat classical. As to the future, it is shown that steel is based more essentially on coal and wages, which have either a marked rising tendency during periods of expansion or are unelastic during recessions, while aluminium depends basically on electric power and capital charges. In all uses where the special qualities of aluminium, light-

ness, resistance to corrosion, etc., are not specially required, however, the large gap in prices still prevailing in favour of steel will prevent aluminium from being a competitive metal in the majority of utilizations.

ALUMINIUM PROSPECTS BY INDUSTRIES

Railways: In view of the search for lighter materials leading to higher pay loads and economies in running and maintenance costs, the use of light alloys is likely to increase, particularly in passenger rolling-stock and especially where rapid acceleration and deceleration are important, as in suburban lines.

Cars: Aluminium alloys have been used in place of iron and steel casting in the engine, transmission and chassis for a considerable time, and there is a tendency to use them on an increasing scale. The possibilities afforded by aluminium in the motor vehicle industry are such that this metal may well become a growing threat to steel.

Shipbuilding: Aluminium is being used on an increasing scale in superstructures, particularly in large and medium sized passenger vessels and in light craft. There is little prospect of a significant increase in the amount of aluminium used in the hulls of sizable vessels.

Packaging and Containers: Aluminium appears to be

approaching its maximum usage in the expendable-container industry and it would seem that it is economic only under special conditions, such as the fish-canning industry in Norway, where aluminium is relatively cheap and there is no indigenous tinplate industry. There is a general tendency towards increasing the use of aluminium in many types of semi-durable containers.

Building and Civil Engineering: The possibility of using aluminium on an appreciable scale in the structural field has been opened up comparatively recently and here growing inroads into the use of steel can be expected. The same is true of prefabrication and scaffolding, for which aluminium is particularly suitable. There are also various non-structural applications. Aluminium is likely to find a growing application in the manufacture of household equipment and many of these outlets are likely to be at the expense of sheet steel.

In consideration of the large scale production of aluminium, it appears that on a world wide basis State participation in the aluminium industry would seem to assume a totally different character from that in the other basic industries. In the field of aluminium production the forces making for State intervention in financing are particularly strong, owing to the demands of rearmament and the magnitude of the capital investment required.

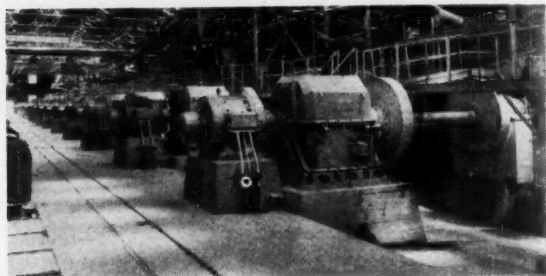
WORLD PRODUCTION OF PRIMARY ALUMINIUM AND OF CRUDE STEEL
1939, 1952, 1953 and 1960
000's tonnes

Country or region	1939		1952		1953		1960	
	Tons (Actual)	%	Tons (Actual)	%	Tons (Estimated)	%	Tons (Planned)	%
Primary aluminium								
North America ..	223	32	1,305	65	1,800	68	2,837	62
Europe (excluding U.S.S.R.) ..	377	54	446	22	466	18	741	16
U.S.S.R. ..	73	10	210	11	330	12	545	12
Japan ..	22	3	43	2	50	2	100	2
Asia (excluding U.S.S.R. and Japan) ..	10	1	8	—	8	—	28	1
Australia ..	—	—	—	—	—	—	25	1
Africa ..	—	—	—	—	—	—	220	5
Latin America ..	—	—	2	—	2	—	60	1
Total World ..	705	100	2,014	100	2,656	100	4,556	100
Crude Steel								
North America ..	49,304	36	87,888	42	105,750	45	121,500	39
Europe (excluding U.S.S.R.) ..	58,914	44	74,120	35	75,000	32	101,400	33
U.S.S.R. ..	17,700	13	34,500	16	38,000	16	60,000	19
Japan ..	6,696	5	6,988	3	7,600	3	10,000	3
Asia (excluding U.S.S.R. and Japan) ..	1,713	1	2,600	1	2,650	1	8,600	3
Australia ..	1,191	1	1,647	1	2,075	1	3,000	1
Africa ..	395	—	1,320	1	1,375	1	2,150	1
Latin America ..	211	—	2,060	1	2,125	1	4,540	1
Total World ..	136,124	100	211,123	100	234,575	100	311,190	100

MACHINERY AND EQUIPMENT

Mining Equipment in South Africa

The association of the David Brown Corporation Ltd. with South Africa began shortly after the first world war, and after the difficulties of delivery experienced between the Union and the United Kingdom during the second world war, the interests of the Corporation had reached a critical stage of development. Small gear units were the primary requirement and to meet the situation in 1946 David Brown and Sons S.A. (Pty.) Ltd. was established as sales and distribution centre for the Corporation's gears.



Battery of 24 David Brown helical gear co-axial units of 32 in. centres transmitting 300 h.p. at a gold mine near Johannesburg

As a result of this foresight, the first Orange Free State mine to go into production was equipped with 16 sets of 350 h.p. tube mill drives. To-day, every mine in that province is equipped with David Brown helical gearboxes, while in addition winder gears have been supplied by David Brown and Sons (Huddersfield) Ltd. Helical gearboxes had initially been manufactured by the Corporation in South Africa as stock units, but in 1949 gears from the Corporation were manufactured in the Union for the first time. In the same year, Precision Equipment (Pty.) Ltd. was acquired at Benoni, and in January, 1951, the first locally-built Radicon worm reducer was produced. The trend of development was continued when, in 1953, the first 17 in. helical gearbox units were produced at David Brown Precision Equipment (Pty.) Ltd.

These interesting facts are contained in the Corporation's *Annual Report, 1953*, a well produced and comprehensive brochure.

Roof Bolting Equipment for U.K. Mines

The methods of working peculiar to collieries in the United Kingdom have led the Consolidated Pneumatic Tool Co. Ltd. to develop suitable British roof bolting equipment. Many yards of roof, bolted by tools manufactured by the company, are now in existence in underground coal workings in this country.

The roof bolting equipment manufactured by the Consolidated Pneumatic Tool Co. Ltd. is equally suited to the split rod wedge or shell type of roof bolt, which are inserted and set in the usual manner; an operation which has previously been described in *The Mining Journal*.

The drilling equipment available from the manufacturers comprises two drills, the CP 3275 rotary and the CP 32 rock drill. The rotary unit is mounted on an air feed cylinder and is set between roof and floor, controlled by one operator. This type of drill is suitable for most strata conditions and in normal formations drilling speeds average 5 f.p.m. The standard air feed cylinder has a 2 ft. stroke. The CP 32 is supplied on a stoper air cylinder for hard roof conditions.

The CP 115 hammer is mounted on an air feed cylinder for bolt driving, the tool being fitted with a dolly, and the CP 365 impact wrench is used to expand the shell to the necessary tightness. In so far as nut tightening is concerned, the CP 366 RP impact wrench is used to drive home the nut to required torque. The tool will handle all types of bolt up to 1½ in. diameter.

In an interesting explanatory pamphlet, the manufacturers show in diagrammatic form the equipment necessary for placing roof bolts under different conditions. For driving wedge bolts in a roof height of approximately 4 ft. where the strata permits of rotary drilling, the machines employed are the CP 3275 drill mounted on air feed cylinder, the CP 115 hammer on air feed cylinder, and the CP 365 RP impact wrench for driving and nut running. Similar equipments could be used in a situation where the roof height is less than 4 ft. but where conditions are identical.

Roof conditions of hard stone requiring a percussive drill are met by the use of the CP 32 rock drill and stoper feed. The equipments used in this application are the CP 32 on air feed cylinder and the CP 365 RP impact wrench.

Portable Welding Machine

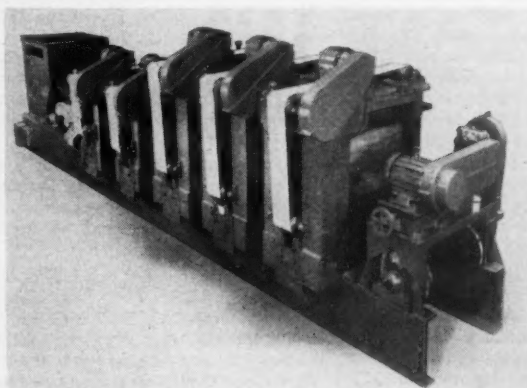
A new portable automatic welding machine has been demonstrated by Reynolds Metal Company in America during the actual laying of the longest aluminium pipeline ever put down, a 12-mile high-pressure link between the White Point gas field and the Reynolds aluminium plant near Corpus Christi, Texas.

The company claims that the welding machine will make aluminium pipelines competitive with steel in price and will increase the use of this metal in high-pressure gas lines. The machine was able to weld 40 ft. sections of 8½ in. aluminium pipe in place at an average time of two minutes.

A Cross-belt Type Magnetic Separator

The manufacture of a Dings Cross Belt Magnetic Separator, destined for Tasmania, has recently been completed by Rapid Magnetic Machines Ltd. This equipment, now available in England, is an addition to the Rapid range, namely the O.G. and the Rapidity. The function of the new unit is similar to the O.G., but it is of greater capacity.

Any number of cross belts can be provided, the deciding factor being the number of products to be concentrated, and the volume handled. An eight-belt unit, for example, handles as many as eight different magnetic materials and one non-magnetic product. This is achieved by varying the strength of each cross belt magnet, so that magnetic materials with different susceptibilities are separated one from the other as well as from the prevalent non-magnetic content. Basically, the flow sheet



The EBK magnetic separator

follows that of similar types inasmuch as the strongest magnetic mineral is removed at the first cross belt stage, the weakest being extracted last.

The machine employs a unique pick-up principle which results in a high degree of selectivity. Capacities vary with each individual problem, but sizing of the ore particles before operation increases both capacity and efficiency. The machine illustrated, the EBK, is of the five cross belt pattern, being approximately 20 ft. long and weighing over 12 tons.

METALS, MINERALS AND ALLOYS

The recent rises in the price of metals have been maintained and a tone of optimism inexplicably seems to persist. The American trade situation is extremely complex with some developments that look favourable and others the reverse. Any forecasts either way, however, are still in the domain of guesswork; or at any rate President Eisenhower does not seem to be able to reach a conclusion that heroic measures for dealing with any threatened large recession are necessary.

The U.S. Department of Commerce announced this week that slackening of business activity is continuing—the mining equipment industry in particular is significantly mentioned as one which has suffered most. The decline is attributed largely to the continued running down of manufacturers' stocks and to reduced defence orders.

The U.S. outlook in regard to the various metals is spotty. The aluminium industry is said to be fast pulling ahead of the current period of economic readjustment. On the other hand reports of the great iron and steel industry are still far from reassuring and the period when an upturn in business can be looked for is being progressively deferred.

Apprehension is particularly prevalent in labour circles. The C.I.O. chiefs, Mr. P. Reuther (United Auto Workers) and Mr. McDonald (United Steel Workers), recently expressed the view that the national economic position was deteriorating. Mr. Reuther, after a nation wide tour of steel plants, expressed the fear that a freeze-up is developing and declared that the U.S. was up against the same problem as in 1929, owing once more to the workers producing more than they had the purchasing power to consume. It is significant in this connection that the recent report of the Labour Department's Bureau of Employment stated that in no area in the country was there a labour shortage, and that some 23 per cent of the areas have substantial labour surpluses.

On the other hand the Government's statement issued through the office of Defense Mobilisation that there will be no disposal of surplus materials acquired, or to be acquired, on Government account, unless there is a clear indication that this would have no serious adverse effect on market prices.

COPPER.—The accumulation of Chilean copper continues and Señor Barros, the Foreign Minister, is reported as putting existing stocks now at 200,000 tonnes. The Chilean Minister of Labour stated that the representatives of the big American companies had agreed to wait 15 days before making any reduction in personnel or output. According to another report the U.S. Government was continuing negotiations for the purchase of 100,000 tons of Chilean surplus for stockpile contingently on Chile approving more favourable legislation in the treatment of the interests of their nationals. The Bill granting new conditions for the American owned copper companies is still under discussion in Santiago.

That the Chilean Government cannot continue backing and filling indefinitely is emphasized by the forecast of the Foreign Exchange Board that the foreign exchange budget may have to be reduced some 25 per cent from the original figure of \$467,600,000 as a result of the unsold copper backlog.

In the States the supply of copper remains tight and the electro price firm at 29½-30 c. Consumption of new refined metal by fabricators in February is reported at 93,342 s.tons (January 100,805 s.tons). The imposition of restrictions on the export of scrap is being unanimously opposed by scrap dealers and exporters in U.S. They told the Government agencies that there was no shortage of scrap in the U.S. but as domestic demand had declined they had to look to foreign countries for customers because of decreased domestic orders. Foreign demand had hitherto been good but is showing signs of falling off.

LEAD AND ZINC.—Recent statements by the O.D.M. referred to this week under "Notes and Comments," were interpreted by some sections of the American trade to imply an imminent resumption of stockpile purchases for lead and zinc. The O.D.M.'s policy statement is reported as saying *inter alia* that the President might decide to add further excess stocks to the stockpile (no particular metals were named) even if present stockpile targets were already complete provided that he "deems

such action to be in the public interest." This seemingly well-intentioned statement is reported to have galvanized some Congressmen from the Western States into opposition on the grounds that short-term relief through further stockpile purchases might militate against the recommendations of the Tariff Commission which is due to report to Congress at latest by April 20.

American consumer demand for lead is reported to be considerably better this past week and certain custom smelters are reported to believe that lead may go above the current level of 13 c. It is, however, difficult to see what can be prompting this optimism other than the temporarily stimulating effect of the O.D.M. statement.

The U.S. zinc price has remained steady this week at 9½ c. for Prime Western.

TIN.—Considerable doubts are being voiced on both sides of the Atlantic regarding the fate of the International Tin Agreement. As indicated here last week, if France, Germany, Canada, Italy and any other single country fail to ratify, the Agreement cannot come into force. France was known to be severely critical of the price range written into the Geneva Agreement, and Germany is also believed to be opposed to the scheme. Countries which have still to sign are, however, understandably anxious to avoid the charge of having wrecked the scheme, and are presumably waiting for somebody else to make the first move. In this connection it appears probable that Canada's decision will prove of key importance, and if, despite her understandable annoyance over Britain's attitude to the Wheat Agreement, her support is forthcoming, it seems likely that she will carry the other countries with her.

The Bolivian Ambassador in Washington has asked the R.F.C. to extend Bolivia's contract for tin concentrates to another year at ruling world prices. The present contract which is due to expire at the end of this month provides for the sale to the States of between 15,000 tons and 20,000 tons of tin-in-ore per year. Washington reports indicate that the R.F.C.'s reaction has not been encouraging.

The threatened strike at the Penang works of the Eastern Smelting Company has been deferred, pending further negotiations proposed by the Penang Labour Commissioner.

ALUMINIUM.—Aluminium production in the United States continues to expand, despite the shortage of electric power owing to dry weather in the Tennessee valley in the spring and the North West in the autumn. Aluminium output according to the U.S. Bureau of Mines was 1,252,000 s.tons, slightly exceeding earlier estimates last year. Stocks at the end of the year were 39,317 s.tons compared with 7,274 s.tons at the beginning of the year. Monthly production reached the new high record of 126,247 s.tons in January last.

QUICKSILVER.—The U.S. price was raised last week from \$198/202 to \$203/206 per flask. The London price is unchanged.

TUNGSTEN.—The recent firmer look to the tungsten market has been sustained this week both here and in the States. Consumers are reported to be anxious to secure spot metal, either afloat or for April shipment, but there is apparently practically no tonnage available for early delivery. However, as we pointed out in this column a fortnight ago, the whole outlook may be substantially altered now that the South Korean government has to seek a market outside the States for the 15,000 tons of tungsten per annum which it was formerly under contract to supply.

The United States price for tungsten ores was raised at the beginning of the week, and now stands at \$16-18 per s.ton unit, plus \$8 import duty.

URANIUM.—It is reported from Brussels that the agreement for the purchase of Congo uranium dating from 1944 will expire this year. Under this agreement almost all the uranium output of the Congo was disposed of to an Anglo American purchasing agency. It is believed that secret negotiations are proceeding between Great Britain, the U.S., and Belgium for continuing the supply. As our Brussels correspondent indicated in our issue of February 26, Belgium has of late not been

altogether satisfied with the terms of the present agreement.

In any event, even if demand from the U.S.A. and Great Britain falls off as other sources of supply come into production, it is hoped in Belgium that the new atomic pile plant which is being erected near Antwerp will be able to take up the slack in the demand for Congo produced uranium. It was recently reported that Belgian scientists have now developed their own uranium extraction process.

GOLD.—The London Gold Market opened on Monday of this week after an interval of 15 years. The first gold price established was 248s. 6d. per f.oz., an increase of 6d. over the price given by the Bank of England for official transactions before the market was freed. As we go to press this price has declined to 248s. 3½d. The opening of the London market is the subject of comment in this issue on page 357.

Iron and Steel

There is still no hint of recovery in the American steel industry, or even that the subsidence has been arrested. Production is barely equal to 70 per cent of rated capacity and the improving of demand, which usually begins in the spring, has yet to develop.

In this country the pattern of demand remains remarkably steady. Sooner or later it was bound to happen that a rapidly expanding output would overtake domestic requirements and with few exceptions that position has now been reached.

Even the plate mills are coping more successfully with the swollen demand and any shortage which still persists is confined to ¼ in. and 5/12 in. thicknesses. The call for black and galvanized sheets is particularly brisk and it is now difficult to place an order either for home delivery or for export earlier than July. On the other hand, the call for small bars and light sections is very restricted and this is reflected in the limited demand for billets. Ample supplies of steel series are now available from home sources and accordingly a new Order has been issued re-imposing import duties on blooms, billets, slabs, bars and rods and also upon unfabricated girders, beams, joists and pillars and unfabricated angles, shapes and sections.

Blast furnacemen are turning out record tonnages of pig iron, but still they cannot satisfy all requirements and fairly large tonnages are still arriving from various European ports not only on the Western European sea board but also from the Black Sea ports.

Similarly, deliveries of home bought scrap are insufficient to meet the heavy requirements of the steel works and foundries and it is calculated that at least 800,000 tons of foreign scrap will have to be imported during the course of the current year. Present stocks of steel works scrap are estimated to exceed 600,000 tons but this only represents three weeks' consumption and the steel makers are more anxious to increase their reserves than to make any withdrawals.

A much more active call for cast iron scrap for foundry use has also developed and it is understood that the trade organization has made representations to the Minister of Supply for revocation of the cast iron scrap control.

The London Metal Market

(From Our Metal Exchange Correspondent)

In spite of a wave of heavy buying of tin in Singapore last Friday, which temporarily forced the price very much out of line with other world markets, the London market has remained steady with sellers predominating whenever the forward price crossed the £700 per ton mark. Demand has remained good, and the backwardation has therefore continued at a figure which the market as a whole would like to see considerably reduced. On Thursday morning the Eastern price was equivalent to £706½ per ton c.i.f. Europe.

The lead demand both in America and Europe has not been impressive, but the London price has strengthened slightly on a small turnover. The zinc market, however, has been more active, and there has been an appreciable rise in the price level. The main factor behind the rise in each metal must have been the rumour that the American authorities may recommence stockpiling, as actual business has warranted nothing better

than the maintenance of the price level.

The copper market remains firm with rather more interest being taken in forward metal, which has tended to decrease the backwardation. Consumer demand remains good, and there are some signs that order books are lengthening, thus permitting fabricators to purchase metal for delivery up to the end of the second quarter: this tendency is also being accentuated by the scarcity of nearby metal from every quarter. The scrap situation is still acute, and customs smelters in America have had to raise their intake prices in order to be able to keep themselves going: this state of affairs means that it is unlikely any reduction in the price of wirebars will be initiated by the customs smelters for some time to come. In Europe, demand for copper runs at a high level, and some interest is already being shown in metal for arrival at the beginning of the third quarter.

Closing prices and turnovers are given in the following table:—

	March 18		March 25	
	Buyers	Sellers	Buyers	Sellers
Tin				
Cash	£740	£750	£725	£730
Three months	£693½	£694	£690	£692½
Settlement		£750		£730
Week's turnover		920 tons		610 tons
Lead				
Current month	£87½	£87½	£87½	£88
Three months	£85½	£86	£86½	£86½
Week's turnover		3,950 tons		2,550 tons
Zinc				
Current month	£73½	£74	£75½	£75½
Three months	£72½	£72½	£74½	£74½
Week's turnover		4,225 tons		4,350 tons
Copper				
Cash	£235½	£236	£238	£239
Three months	£225½	£225½	£229	£229½
Settlement		£236		£239
Week's turnover		5,075 tons		6,125 tons

OTHER LONDON PRICES—MARCH 25

ANTIMONY

English (99%) delivered,	
10 cwt. and over	£210 per ton
Crude (70%)	£200 per ton
Ore (60% basis)	22s./24s. nom. per unit, c.i.f.

NICKEL

99.5% (home trade)	£483 per ton
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OTHER METALS

Aluminium, 99.5%, £156 per ton	Osmiridium, £40 oz. nom.
Bismuth	Osmium, £50 oz. nom.
(min. 4 cwt. lots) 16s. lb.	Palladium, £7 10s. oz.
Cadmium (Empire), 13s. lb.	Platinum, £30/£31
Chromium, 6s. 5d./7s. 6d. lb.	Rhodium, £43 10s. oz.
Cobalt, 20s. lb.	Ruthenium, £23 oz.
Gold, 248s. 3½d. f.oz.	Quicksilver, £69/£70
Iridium, £55 oz. nom.	ex-warehouse
Magnesium, 2s. 10½d. lb.	Selenium, 35s. 9d. nom.
Manganese Metal (96%·98%)	per lb.
£225/£262	Silver 73½d. f.oz. spot and f.d.
	Tellurium, 15s./16s. lb.

ORES, ALLOYS, ETC.

Bismuth	65% 8s. 6d. lb. c.i.f.
	60% 8s. 3d. lb. c.i.f.
Chrome Ore—	
Rhodesian Metallurgical (lumpy)	£14 5s. 6d. per ton c.i.f.
" " (concentrates)	£14 5s. 6d. per ton c.i.f.
Refractory	£13 17s. 6d. per ton c.i.f.
Baluchistan Metallurgical	£15 19s. 6d. per ton c.i.f.
Magnesite, ground calcined	£26-£27 d/d
Magnesite, Raw	£10-£11 d/d
Molybdenite (85% basis)	102s. 4d.-103s. per unit c.i.f.
Wolfram (65%)	World buying 130s. nom.
	120s. U.K. Selling
Scheelite (65%)	World buying price 125s. nom.
"	115s. U.K. Selling
Tungsten Metal Powder ..	12s. 3d. nom. per lb. (home)
(98% Min. W.)	
Ferro-tungsten	9s. 3d. nom. per lb. (home)
Carbide, 4-cwt. lots ..	£35 13s. 9d. d/d per ton
Ferro-manganese, home ..	£53 10s. 0d. per ton
Manganese Ore Indian c.i.f. Europe	
(46%·48%)	7s. 4d. - 7s. 9d. per unit
Brass Wire	2s. 4½d. per lb. basis
Brass Tubes, solid drawn ..	1s. 8½d. per lb. basis

THE MINING MARKETS

(By Our Stock Exchange Correspondent)

The gilt-edged market was naturally overshadowed by the new £500,000 4 per cent Loan issued by Ceylon. This carries a medium date and is offered at 97 per cent. The terms were favourably received. It is Ceylon's first approach to the market since her independence. The new regulations allowing freer dealings in sterling were welcome, but in fact they will make little change to the underlying principles already existing and the major effect will be simplification.

Another important step has been the restoration of the gold market in London. South Africa has announced her intention to sell gold in the London market. Monday was the first day of dealing and the opening price was fixed at 248s. 6d.

Finance houses were little changed but West Witwatersrand and West Rand Investment Trust were both favoured and investment buying took place. On the other hand, Johnnies suffered a sharp fall following the unfavourable rumours concerning the Freddie's mines. Rand Mines were quiet before the South African budget but tax concessions announced in it on Wednesday caused a resurgence of confidence and a late rise. Uranium issues were again neglected but older mines improved on hopes concerning future production. Hartebeestfontein shares ended the week at around 5s. 6d. premium after extremes of 6s. 3d. and 4s. 6d.

The Orange Free State market was thoroughly upset by strong and persistent rumours, later confirmed, of a coming capital reorganization by Freddie's North and South. This was said to be due to high working costs, much above the original estimate, and bad ground. Most other shares in this group were under the shadow of this factor, but St. Helena and Harmony recorded small but encouraging gains.

The West African market was featureless and very quiet but Australians improved patchily. This latter section was cheered by the dividend of AIs. 6d. per share declared for the year by Gold Mines of Kalgoorlie as against AIs. 3d. last year.

Diamonds were also neglected except for a further advance

in De Beers Preferred due to renewed investment buying. Platinum were the turn harder on favourable press comment.

Copper shares encountered much more interest but were still rather mixed due to reports of the probability of higher rail costs in Rhodesia. Chartered improved sharply after being quoted ex dividend. Most of the leading Rhodesian shares were better on hopes that sales of metal by Chile will be controlled and will not upset the world balance. Both here and in North America the outlook for the metal is regarded in a more optimistic light than six months ago. It has been pointed out that both the United States and Chile are high cost producers and that strikes in the latter country are likely to hinder production. Roan Antelope have announced plans for a new electrolytic plant to cost £3,000,000. The scheme encouraged a rise in shares. Rio Tinto also rose on favourable reports of the prospecting being carried out by the company in Rhodesia and Canada. Tanks jumped on Union Minière prospects. There was some activity in Rhodesia Katangas following the better development news, but the shares ended unaltered on the week.

Tins rose on the firm metal price and the more optimistic outlook for the future. Ampats were again a feature. Following strong press tips they at one time rose as high as 8s. 9d. Nigerians recorded little change. This market was depressed by the lower dividend from United Tin.

Lead/zinc shares were mostly the turn harder. The improvement took place after the increase in the metal price and the more hopeful outlook. There has even been a rumour that the United States might resume stockpiling. Mount Isa recorded a big jump. Uranium has been discovered north of the property and it is understood that a claim has been pegged by the company.

Canadians fell due to the fall on Wall Street, but steadied later. Canadian circles are reported to be taking a more favourable view of the outlook for base metal propositions operating in the Dominion.

FINANCE	Price Mar. 24	+ or - on week	O.F.S.	Price Mar. 24	+ or - on week	MISCELLANEOUS GOLD	Price Mar. 24	+ or - on week	TIN (Nigerian and Miscellaneous) contd.	Price Mar. 24	+ or - on week
African & European...	2 1/2	—	Freddie's	7 1/4	—1 1/4	(contd.)			Geevor Tin	11/3	+ 3d
Anglo American Corp.	6 5/8	—	Freddie's N.	7 1/4	—2	St. John d'El Rey	19/9	+ 3d	Gold & Base Metal	3 1/2	—1 1/2d
Anglo-French	18 1/2	—	Freddie's S.	7 1/4	—1 1/2	Zams	33/3	+ 1 1/2	Jantar Nigeria	9/3	—
Anglo Transvaal Consol.	25 1/2	—	F. S. Geduld	4 1/2	—	DIAMONDS & PLATINUM			Jos Tin Area	13/3	—
Central Mining (El shrs.)	29/3	—	+ 6d Geofores	14 1/2	—6d	Anglo American Inv.	4 1/2	—	Kaduna Prospectors	2 1/4	—
Consolidated Goldfields	48 1/4	+ 4 1/2	Harmony	30/3	+ 10 1/2	Casto	23 1/2	—6d	Kaduna Syndicate	2 1/4	—
Consol. Mines Selection	30 1/2	+ 7 1/2	Lorraine	11/3	—6d	Cons. Diam. of S.W.A.	5	—	London Tin	5 1/4	+ 10 1/2
East Rand Consols.	3 1/4	—	Lydenburg Estates	16/3	—6d	De Beers Delf. Bearer	81/6	—3d	United Tin	3 1/4	—1 1/2d
General Mining	4	—	Merriespruit	11/6	+ 4 1/2	De Beers Delf. Bearer	17	—	SILVER, LEAD, ZINC		
H.E. Prop.	38/9	—	Middle Wits	14 1/4	—3d	Pots Platinum	8 1/2	+ 3d	Broken Hill South	2 1/2	+ 3d
Henderson's Transvaal	7/9	—3d	Osifits	2 1/2	—1 1/2	Watervaal	12/9	+ 3d	Burma Mines	2 1/4	—1 1/2d
Johnnies	45 1/2	—3 1/2	President Brand	2 1/2	—	LPPER			Consol. Zinc	29 1/4	—1 1/2d
Rand Mines	3 1/2	—	President Steyn	31/6	—	Chartered	67 1/4 XD	+ 1 1/2	Lake George	7 1/4	+ 1 1/2d
Rand Selection	34 1/4	—	St. Helena	24/6	+ 4 1/2	Esperanza	7 1/4	—4 1/2	Mount Isa	36/3	+ 2/9
Strathmore Consol.	32/6	—	Virginia Ord.	13/3	—7 1/2	Indian Copper	4/6	—	New Broken Hill	24 1/2	—
Union Corp. (2 1/2 units)	29/9	—3d	Welkom	20/6	—6d	Messina	3 1/2	—	North Broken Hill	2 1/2	+ 3d
Vereeniging Estates	4 1/2	—	Western Holdings	4 1/2	—	Nchanga	7 1/2	+ 3d	Rhodesian Broken Hill	9 1/4	—1 1/2d
Wits	35 1/2	+ 1 1/2				Rhod. Anglo-American	53/3	—3d	San Francisco Mines	18/9	+ 6d
West Wits	41 1/4	+ 1 1/2				Rhod. Katanga	14 1/2	—	Uruwira	3 1/2	—
						Rhodesian Selection	15/9	+ 3d	MISCELLANEOUS		
						Rhokana	19 1/2	+ 1 1/2	BASE METALS & COAL		
						Rio Tinto	24	—	Amal. Collieries of S.A.	41/6	—
						Selection Trust	16/3	+ 1 1/2	Associated Manganese	44/6	—6d
						Tanks	36/3	—9d	Cape Asbestos	25 1/2	—3d
						Tharsis Sulphur Br.	67/6	+ 5/3	C.P. Manganese	58/6	+ 3d
							53/9	+ 2/6	Consol. Murchison	37/6	—2 1/2
									Mashaba	41/4	—
									Natal Navigation	2 1/2	—
									Rhod. Monteleo	1/9	—
									Turner & Newall	74/3	—9d
									Wankie	13 1/2	—
									Witbank Colliery	3 1/2	—
									CANADIAN MINES		
									Apex	\$30	—1
									Attock	\$24	—2
									Burmah	\$76	—5
									Canadian Eagle	\$68 1/2	+ 1/2
									Hollinger	\$4 1/2	—
									Hudson Bay Mining	\$119	—1
									International Nickel	\$5 1/2	+ 1/2
									Mining Corp. of Canada	\$3	—
									Noranda	\$19 1/2	—
									Quemont	\$5 1/2	+ 1/2
									Yukon	3/9	—
									OIL		
									Anglo-Iranian	10 1/2	+ 3d
									Apex	45 1/2	+ 7 1/2d
									Attock	41/3	—
									Burmah	73/9	—6d
									Canadian Eagle	30/6	+ 1/3
									Mexican Eagle	20/3	—1 1/2d
									Shell (bearer)	5 1/2	+ 3d
									Trinidad Leasehold	19/6	+ 1 1/2d
									T.P.D.	24 1/2	—3d
									Ultramar	25/9	—1 1/2

COMPANY NEWS AND VIEWS

Union Corporation Maintains Distribution

Union Corporation, in a preliminary profit statement, have announced a distribution of 1s. 4d. (U.K. currency) per 2s. 6d. share, free of U.K. income tax, equivalent to 53½ per cent. The unchanged final dividend was 10d. per share, absorbing £387,500, and the total distribution of 1s. 4d. required £620,000, equivalent to a gross dividend of 2s. 5d. per share with U.K. income tax at 9s. in the £.

The appreciable savings on U.K. tax liabilities, which declined from £818,300 to £433,700, has enabled the reduction in untaxed profits of £215,640 to £1,660,805 to emerge as a net profit of £1,227,105, or an increase of £168,960 over the preceding year. The sum of £600,000 (£400,000) has been allocated to exploration reserve, while the forward balance has been raised to £358,791 compared with £351,686 brought in.

Rhodesia Broken Hill Pays 20 Per Cent Against 40 Per Cent

An advance profit statement issued by the Rhodesia Broken Hill Development Company, giving the financial results for the year 1953, showed that untaxed profits fell to £1,249,752 (£2,787,427), and that after paying tax charges of £381,856 (£996,063), the net balance was reduced to £867,896 compared with £1,791,364. The sum of £200,000 (£500,000) was allocated to reserve and the total distribution of 20 per cent (40 per cent), equivalent to 1s. per 5s. stock unit, required £650,000 against £1,300,000. The company has announced that it intends to re-incorporate in Northern Rhodesia before the annual meeting is held, in which case the dividend recommended will represent a gross amount of 1s. per stock unit, less 4½d. deducted in respect of Rhodesian tax at 7s. 6d. in the £, leaving the same net amount of 7½d. per stock unit. Dividend warrants will be posted to those registered on April 9 on or about June 16.

Rhokana Maintains Interim at 50 Per Cent

Rhokana Corporation has declared an interim dividend on the ordinary and "A" stock in respect of the year June 30, 1954, at 10s. per £1 unit. As in the case of Rhodesian Anglo American and Rhodesia Broken Hill it is intended to re-incorporate in Northern Rhodesia in terms of the Rho Anglo Group Act before the dividend is paid in which case the dividend will represent a gross amount of 16s. per unit less 6s. deducted in respect of Rhodesian tax, leaving the same net amount of 10s. per unit. Dividend warrants will be posted to those registered on April 19 on or about May 13.

"Rhoanglo" Maintains Interim at 15 Per Cent

Rhodesian Anglo American has declared an interim dividend in respect of the year to June 30, 1954, of 1s. 6d. per stock unit, or 15 per cent. It is intended to re-incorporate the company in Northern Rhodesia before the dividend is paid, so that the dividend will represent a gross amount of 2s. 4½d. per stock unit less 10½d., deducted in respect of Rhodesian tax at 7s. 6d. in the £, leaving the same net amount of 1s. 6d. per unit. Dividend warrants will be posted on or about May 13 to those registered on April 9.

Roan Antelope's £3,000,000 Refinery Project

At the beginning of this week Roan Antelope Copper Mines announced their intention to construct an electrolytic copper refinery in the near future at Ndola, Northern Rhodesia. Previously, Roan disposed the whole of its production as high grade blister copper, but in November last the chairman announced that in the not too distant future the company might have to go over to electrolytic refining.

The refinery will be owned by a new company to be called Ndola Copper Refineries, of which Roan Antelope will take up the ordinary share capital. The rest of the capital will probably be in the form of loan capital to be offered to outside parties in due course. The capital required is estimated to be about £3,000,000. The division as between share capital and loan capital has not yet been finally determined and this will depend on negotiations which are now proceeding. The financial arrangements will also be subject to the necessary Governmental consents being obtained.

The refinery will have an initial capacity of about 55,000-60,000 l.tons of electrolytic copper per annum and will draw its power from the Rhodesia Congo Border Power Corporation.

Production is expected to commence in the year 1958. Roan Antelope will enter into a long-term contract to supply the refinery with up to 60,000 l.tons of blister copper per annum for refining into electrolytic shapes which will be sold by Roan.

The design of the refinery will cater for the possibility of an eventual expansion to 110,000 l.tons of electrolytic copper per annum capacity, calling for additional finance of about £1,250,000 at present price levels. The refinery company may, in due course, be prepared to refine the production of other companies besides that of Roan Antelope.

Kanshanshi's High Copper Values

Exploratory work continues to be pressed forward at the Kanshanshi Copper Mine, the title to which is formally owned by Rhodesia Katanga, and while development results up to December has been somewhat disappointing, the latest report covering the period from January 1 to February 20, 1954, from the Anglo American Corporation of South Africa, who are acting as Consulting Engineers, shows that some encouraging results have been obtained during this period.

The outstanding feature of the report is that a groove sample taken from a vein corresponding in position to "D" vein in a crosscut advanced 300 ft. from the Main South Shaft, averaged 29.59 per cent, of which 21.53 per cent was oxide copper. Good values of sulphide copper have also been obtained. Another sample taken from the "H" vein on which drives were made from the same shaft gave 11.26 per cent total copper which was virtually all of a sulphide nature.

The presence of soft ground and cavities has impeded drilling operations on Hole "J" which has been stopped at a depth of 650 ft. But a deflection is to be made in the hope that a better core will be recovered for examination.

Capt. Charles Waterhouse, chairman, in his review to shareholders, stated that it remains impossible to make an assessment of the potential value of the property until the whole of the exploratory programme has been carried out during the period of the option which expires on December 31, 1955. In this connection, the Consulting Engineers have estimated that a further £200,000 will be required for the present exploration programme bringing the total up to £338,750, which will be provided as required by the cash subscribers to the capital of Kanshanshi Copper Mine *pro rata* to their holdings.

United Tin Areas Good Columbite Price

The importance of columbite to United Tin Areas of Nigeria during the year to June 30 last is clearly brought out in the table immediately below.

Year to June 30	Production C'bite (s.tons)	Assay Tin (l.tons)	Cost Value (% tin) C'bite/tin	Price rec'd per ton C'bite tin	Reserve (tons)
1953	16.5	130	74.29	£450	£2,499
1952	10.4	102	74.38	£336	£1,189
				£586	258
				£710	332

Indeed, it does not require much in the way of mathematical training to see that it took approximately 4½ tons of tin to bring in the same revenue as received from the sale of one ton of columbite.

Year to June 30	Metal Sales £	Mining* Costs £	Tax- ation £	Net Profit £	Divi- dend £	Carry Forward £
1953	112,953	89,435	5,474	2,646	6,188	6,880
1952	83,550	55,105	13,816	6,375	9,450	10,422

* Including administration and general expenditure, royalty, freight, etc.

Certainly, the additional columbite revenue received was more than enough to offset the lower average price received per ton tin but even so it could not counter the increased mining costs which were swelled by a rise in columbite and tin realization charges, royalty, freight, etc., of nearly £7,000 to £24,252 and by increased expenditure on prospecting which advanced from £5,088 to £11,416. Thus the net balance was lower than in the preceding year and to pay 7 per cent (12 per cent) per 2s. 6d. stock unit on the £150,000 issued capital, it was necessary to draw on the forward balance to the extent of £3,542.

At the annual meeting, to be held at Winchester House, Old Broad Street, London, E.C.2, on April 14, the chairman, Mr. A. Hedley Williams, will give an up-to-date statement which will include the latest information regarding the new columbite and tin areas, covering eight square miles, which the company acquired since the end of the year under review and which are currently being thoroughly examined.

THE ZAMBESIA EXPLORING COMPANY

DIVIDEND OF 15 PER CENT

The annual general meeting of the Zambesia Exploring Company Ltd. was held on March 19 in London, **Captain Rt. Hon. Charles Waterhouse, P.C., M.C., D.L., M.P.** (the chairman), presiding.

The following is an extract from his circulated statement:

During the year 1953 operations continued on a steady and satisfactory basis. The profit for the year before taxation was £101,443 for the parent Company and £79,244 for its wholly-owned subsidiary, The Zambesia Investment Company Limited, making a total of £180,687. After providing for current taxation, allowing for adjustment of taxation of previous years, transferring £25,000 from General Reserve, and bringing into account the balance brought forward from 1952, a balance of £113,544 remained available for appropriation in the Parent Company. An interim dividend of 4 per cent less tax had been paid, and provision made for a final dividend of 11 per cent, less tax, making an unchanged total of 15 per cent for the year. The profit of the subsidiary Company after taxation, which amounted to £40,864, had not been distributed but had been added to the balance carried forward, which had been increased thereby to £103,575. The net undistributed profits of the subsidiary Company could be regarded as the equivalent of a transfer to Reserve by the Parent Company, and the total reserves of the parent and subsidiary companies taken together had increased from £514,211 to £526,843.

With regard to the companies in which we hold substantial interests the principal assets of Tanganyika Concessions Ltd. consist of shares and debentures in the Union Minière du Haut Katanga and the Benguela Railway Company. After providing for taxation, the consolidated results of Tanganyika Concessions Ltd., for the year ended July 31, 1953, show a profit of £2,057,914—a record in the history of the company—as compared with £1,827,390 for the previous year.

The dividend declared by the Union Minière du Haut Katanga for the year 1952 was at the rate of Frs.1,250 net per Part Sociale, as compared with Frs.1,000 net for the year 1951. An interim dividend of Frs.600 net per Part Sociale (the same rate as was paid in the previous year) has been declared for the year 1953. Mining extraction during the year 1952 amounted to 5,758,300 tonnes of ore of various kinds, including copper,

cobalt, zinc and uranium ores. The output of copper (205,749 tonnes) and cobalt (6,831 tonnes) was the highest ever recorded.

The Benguela Railway Company, which celebrated its fiftieth anniversary in November, 1952, had a net revenue of Escudos 127,781,284 for the year 1952, as compared with Escudos 97,031,154 for the previous year. Preliminary results for the year 1953, however, reveal a decrease in net operating receipts due mainly to higher working expenses.

Capital expenditure for the year 1952, totalling £1,186,263, was entirely financed out of profits, and no further advance on Loan Account was made by Tanganyika Concessions Limited. The latter Company received from the Benguela Railway Company during the same period the sum of £202,480 in respect of debenture redemption and £223,194 in respect of arrears of debenture interest, but it is not anticipated that any further payment on account of debenture interest will be possible during the current year.

At the annual general meeting of Tanganyika Concessions Limited, which was held at Salisbury, Southern Rhodesia, on January 28, 1954, and which was attended by your managing director, Mr. Robert Hutchinson, the chairman, the Rt. Hon. Sir Ulick Alexander, drew attention to the value of the work which the Company had carried out by financing the capital programme of the Benguela Railway Company, which, by its geographical position, was destined to play an increasingly important part in the development of Central Africa. He expressed the belief that in the reasonably near future this investment would provide an adequate return.

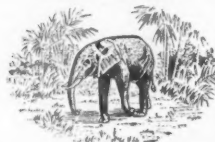
Your company holds 50 per cent of the share capital and has provided 50 per cent of the loan capital of Tanganyika Holdings Ltd. The main interests of Tanganyika Holdings Ltd. are in the Rhodesia-Katanga Company Ltd., and in Kentan Gold Areas Ltd., with its subsidiary, the Geita Gold Mining Company Ltd.

Geita Gold Mining Company. The ore reserve fully developed at June 30, 1953, based on a pay limit calculated to conform approximately to existing conditions in respect of gold price and working costs is estimated at 1,240,000 tons at an average value of 4 dwt. per ton. Compared with the figures submitted at June 30, 1952, this represents a decrease of 672,785 tons, the value being higher by .3 dwt. per ton due primarily to the elimination of sub-economic ore.

The report and accounts were adopted.

Bank of British West Africa Limited

Established 1894



AUTHORISED CAPITAL - £4,000,000

SUBSCRIBED CAPITAL - £3,000,000

PAID UP CAPITAL - £1,200,000

RESERVE FUND - £1,100,000

BANKERS TO THE GOVERNMENTS OF THE COLONIES OF THE GAMBIA, SIERRA LEONE, GOLD COAST AND NIGERIA
The Rt. Hon. LORD HARLECH, K.G., G.C.M.G., Chairman

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37 GRACECHURCH STREET, LONDON, E.C.3

General Manager: F. G. WRIGHT

Secretary: E. J. D. KEWLEY

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	Dunkwa	(Harbour)		Ilesha	Oshogbo
	Hohoe	Takoradi—		Jos	Port Harcourt
	Keta	(Market Circle)		Kaduna	Sapele
	Koforidua	Tamale		Kano	Sokoto
	Kumasi	Tarkwa			Warri
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KENTAN GOLD AREAS, LIMITED

The Annual General Meeting of Kentan Gold Areas, Limited, was held in London on Wednesday last, the Rt. Hon. Earl Grey presiding.

In his Review, circulated prior to the meeting, the Chairman stated:—

Mr. M. T. W. Easby and I have just returned from a visit to the Geita property and while I was there the mine was greatly honoured by a visit from His Excellency the Governor, who showed the greatest personal interest and sympathy in our problems. His Excellency promised his help in many ways and the details of these arrangements are now being settled by the various departments concerned.

Dr. Pelletier, Consulting Geologist, Mr. Campbell Pitt, Chief Consulting Mechanical and Electrical Engineer, and Mr. R. B. Smart, Consulting Engineer, all of New Consolidated Gold Fields Limited, also visited the property early in February and the following extracts from Mr. Smart's report dated February 26, 1954, will be of interest to shareholders.

The Capital Expenditure programme has been reviewed in the light of revised policy and while some items have been cancelled or modified, and others added, the sum total for the programme to the end of 1954 does not exceed the figure quoted in my memorandum of August 3, 1953. Expenditure on authorized estimates, closed and open, to January 31, 1954, was £53,063; authorized and projected estimates from February 1, 1954, to December 31, 1954, total £69,117, making a total estimated expenditure at that date of £122,180. This compares with my previous estimate of £122,200. It is open to doubt whether it will be possible to spend the full amount and thus complete the programme by the end of 1954 because of possible personnel shortages and late delivery of equipment. However, every endeavour will be made to do so in order that we may be in a position to reach the 30,000 tons per month target as soon as possible.

Projected expenditure for the 12 months ending December 31, 1955, is £25,000.

The most important steps to be taken in the immediate future are reconditioning of the aerial ropeway and opening up of the North East Extension. Work on both projects has already started. Reconditioning of the ropeway is expected to take six months. Opening up of the N.E. Extension is being done by advancing the 3rd and 4th Levels from the existing Geita Workings and by driving an adit on the 3rd Level towards the orebody intersection of surface Borehole 15. A holing will be made between the 3rd and 4th Levels in the vicinity of the orebody intersection of surface Borehole 11 and stoping facilities prepared as rapidly as possible. In the meantime drives will be advanced from the adit in both directions along the strike of the orebody. Stopes between the 3rd and 4th Levels should be ready by the end of the year when it should be possible to increase the tonnage from the Geita Section. (A plan of the proposed development programme in the N.E. Extension is attached.) Once the ropeway has been reconditioned and is in commission it will be the policy to progressively increase the tonnage milled. During the second half of this year extra development will be initiated at Ridge 8 in order to increase ore reserves against the time that section will again be a contributor to the mill. When the present capital programme has been completed the mine as a whole should be in a position to mill at the rate of 30,000 tons per month and it is hoped that this target will be reached some time in 1955.

I feel confident that the results of our visit will prove beneficial. The development programme is progressing well and ore reserves are building up satisfactorily, those at Geita and in the approaches to the N.E. Extension showing promise.

With regard to expectations of profit I have no reason to change the views expressed in my previous memorandum, even though the figure quoted there of 8s. per ounce gold premium has now been reduced to zero. This view is based on the expectation that a reduction in working costs will compensate for this loss.

As previously mentioned, working cost figures in recent months are not indicative of the true position at the mine and the losses that have been incurred, following a period of encouraging profits, can be attributed entirely to the failure of the aerial ropeway to operate to the standard for which it was designed. It has been these circumstances that have forced the decision to recondition it completely. Previous attempts to overcome the difficulties by increased maintenance, and improvised modifications having proved abortive, such a decision was inevitable and will, I am sure, more than justify the Capital Expenditure involved.

The report and accounts were adopted.

GEOLOGISTS — DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH. The Civil Service Commissioners invite application for not less than four pensionable appointments at the Geological Survey and Museum. Age at least 21, and under 30 (31 for permanent members of the Experimental Officer Class) on April 1, 1954, with extension for regular Forces service. Candidates must have obtained (or obtain in summer 1954) a university degree with first or second class honours in Geology or an equivalent qualification or possess high professional attainments. One of the posts requires special qualifications in mineralogy and petrology.

Salary for a 45½ hour week (London) (men) £507—£923; (women) £507—£810; somewhat lower in provinces. Provision for starting salary above minimum. Prospects of promotion. Further particulars and application forms from Civil Service Commissioners, Scientific Branch, 30 Old Burlington Street, London, W.1, quoting No. S168/54. Application forms to be returned by April 15, 1954.

HER MAJESTY'S COLONIAL SERVICE

A vacancy exists for a Supervisor, Mines Department, Nigeria. Age limits, preferably under 40.

Qualifications: Candidates should be qualified mining engineers with a diploma or degree from a recognized School of Metalliferous Mining with at least five years experience of alluvial prospecting.

Duties: Plan and supervise pitting and Banka drilling of alluvial mining areas comprising virgin ground, mined areas, overburden and tailings to determine the mineral content (mainly cassiterite and columbite).

Terms of Appointment: On contract gratuity terms with consolidated salary in the scale £895—£1,719 per annum plus gratuity of £25 or £37 10s. according to salary, for each completed three months of resident service payable on satisfactory termination of contract. Outfit allowance, £60. Income tax at low local rates. Quarters at a rental of 10 per cent of basic salary (£715—£1,419). Free first class passages for officer and wife once each way each tour. Special regulations for children's passages. Free medical attendance for officer and family whilst in Colony. Vacation leave at the rate of seven days for each month of resident service.

Apply in writing to the Director of Recruitment, Colonial Office, Great Smith Street, London, S.W.1, giving briefly age, qualifications and experience. Mention the reference number (CDE. 99/14/04).

HER MAJESTY'S COLONIAL SERVICE

A vacancy exists for a Mines Surveyor in Uganda.

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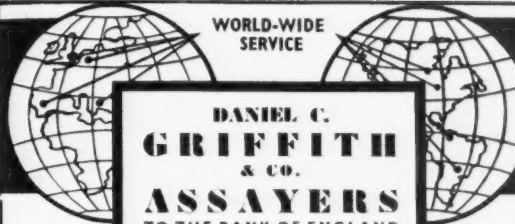
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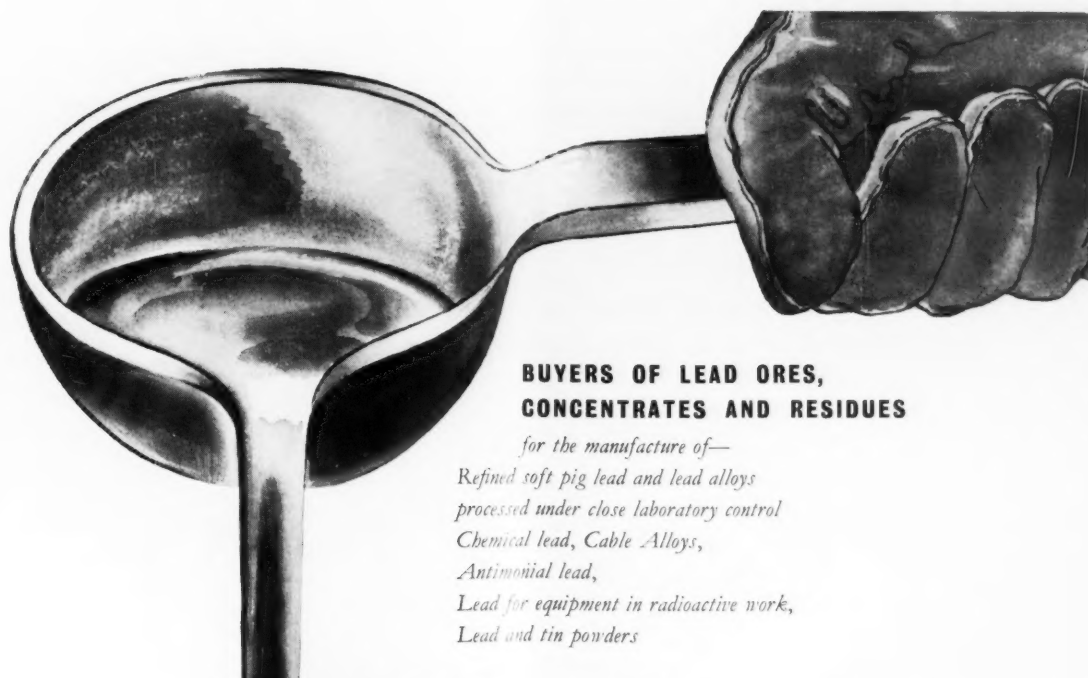
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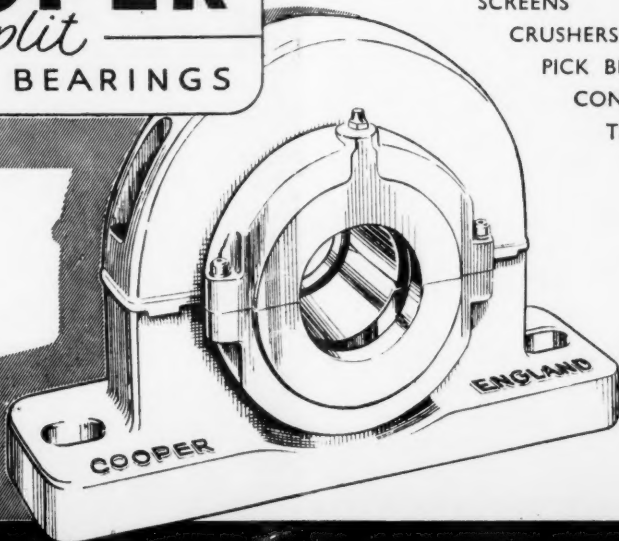
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